

# **SOUTHERN PACIFIC COMPANY**

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## **PROGRAM OF RESEARCH ON OIL BURNING STEAM LOCOMOTIVES**

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### **CONFIRMATORY TESTS WITH DYNAMOMETER CAR AND ENGINE SP-4401**

**San Francisco, Calif.  
March 23, 1951.**

**Dynamometer  
Test No. 14**

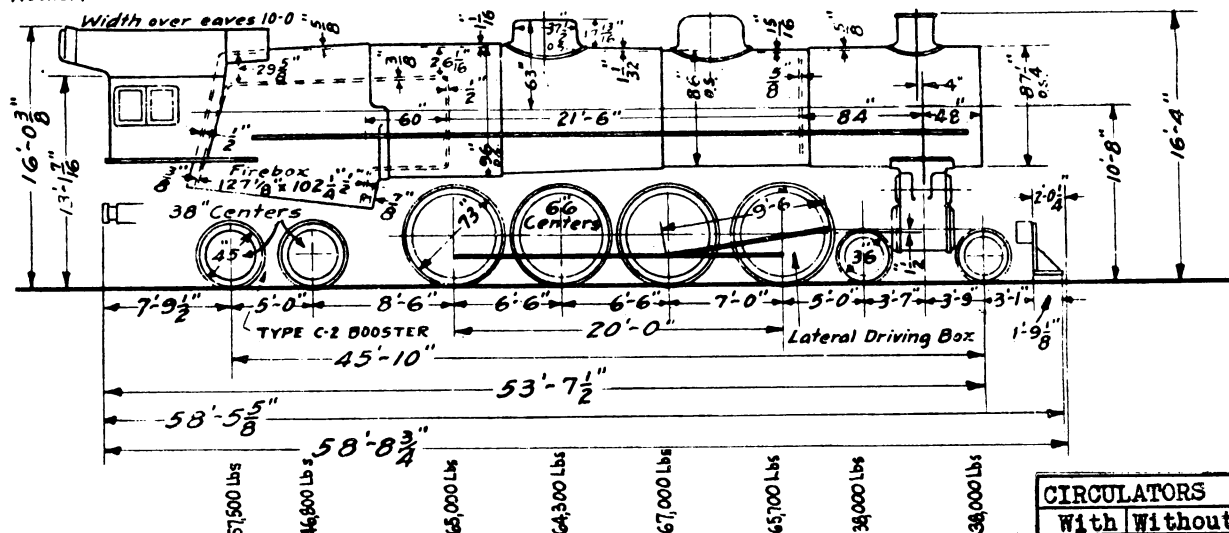


Test locomotive SP-4401 followed by Dynamometer Car SP-137 and Auxiliary Test Car SP-2300 handling maximum tonnage test train at full throttle upgrade near Cabazon, California.

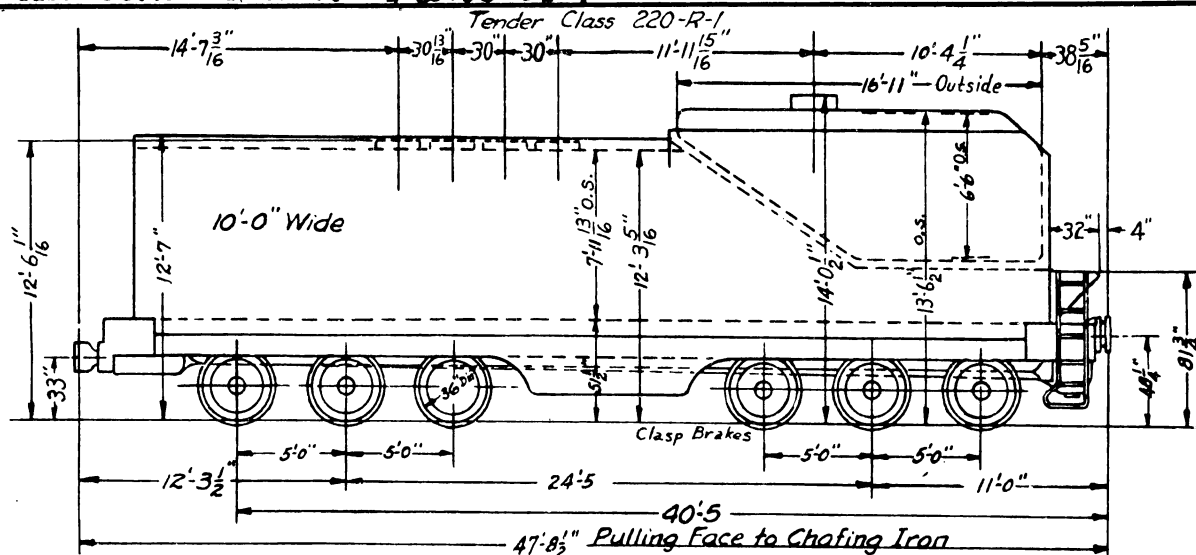


Equipped with NR 5 S  
Worthington Feed Water  
Heater.

Class G5-1, G5-73 <sup>27</sup>/<sub>30</sub> 5-104-SF  
Boiler Pressure 250 Lbs.



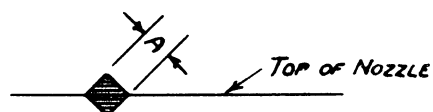
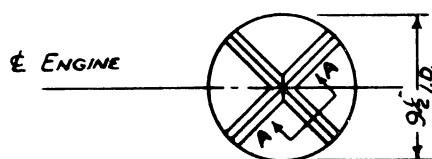
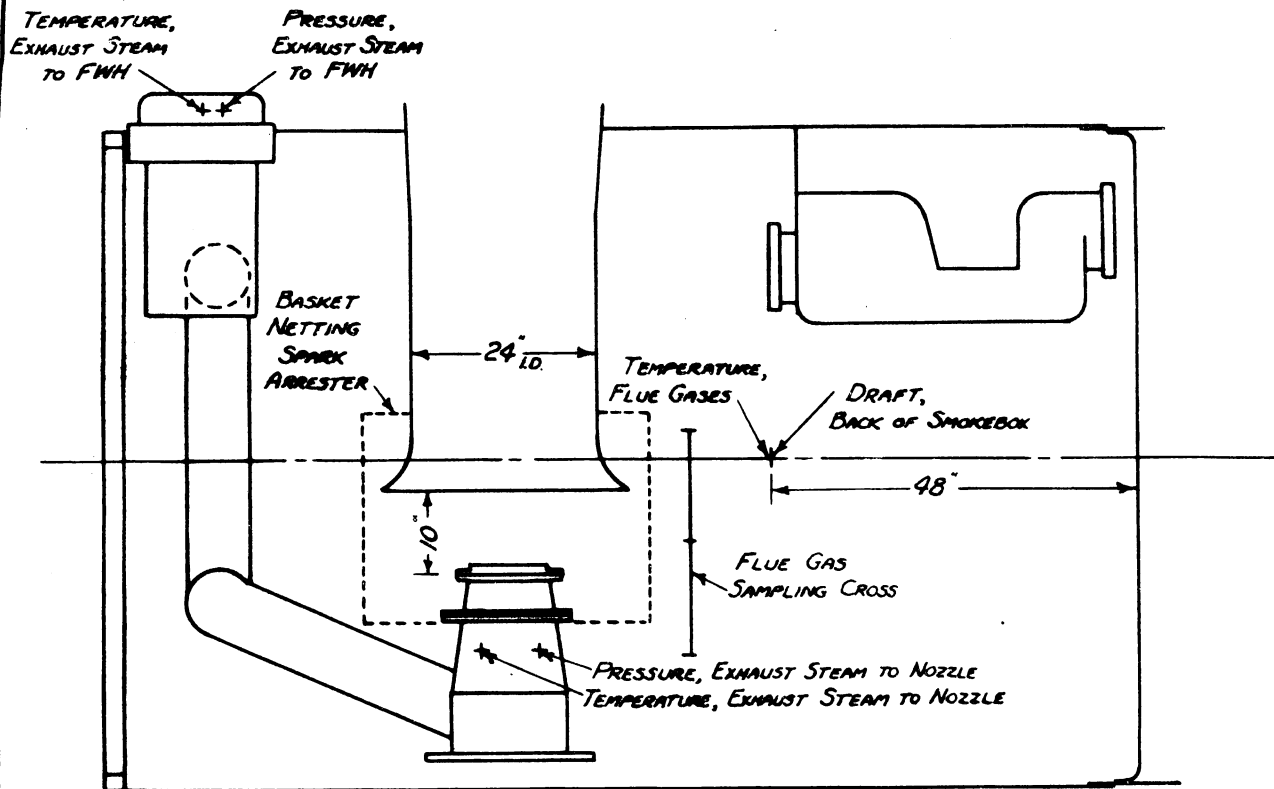
		CIRCULATORS	
		With	Without
Heating Surface of Boiler Tubes	4502	4502	SqFt
Heating Surface of Firebox	476	356	SqFt
Heating Surface-Evaporating	4978	4858	SqFt
Heating Surface of Superheater	1866	1866	SqFt
Heating Surface-Combined	6844	6724	SqFt
Boiler Capacity			
Tractive Effort to Adhesive Wt.	.237		
Tractive Effort-(M.E.P. 83 %)	62,200	Lbs	
Tractive Effort of Booster	13,750	Lbs	
Total Tractive Effort	75,950	Lbs	



#### DIMENSIONS AND WEIGHTS FOR LOADED TENDER.

CAPACITY OF OIL TANK	6,275 GALS.	SIZE OF TRUCK JOURNAL	7" X 14"
GALLONS OF OIL TO MARKER BAR	6,062 GALS.	WEIGHT OF TRUCK	26,950 LBS.
CAPACITY OF WATER TANK	21,600 GALS.	WIDTH OVER FRONT STEPS	10'-1 1/8"
WEIGHT OF TENDER, EMPTY	145,000 LBS.	WIDTH OVER BACK STEPS	9'-10"
WEIGHT OF 21,600 GALLONS OF WATER	180,000 LBS.	EXTREME WIDTH (over Front Steps)	10'-1 1/8"
WEIGHT OF 6,062 GALLONS OF FUEL OIL	50,500 LBS.	Width over end sills	9'-10"
WEIGHT OF TENDER, LOADED	375,500 LBS.		
JOURNAL PRESSURE IN POUNDS PER SQUARE INCH OF PROJECTED AREA			300 lbs.

FIG. 1



SECTION A-A

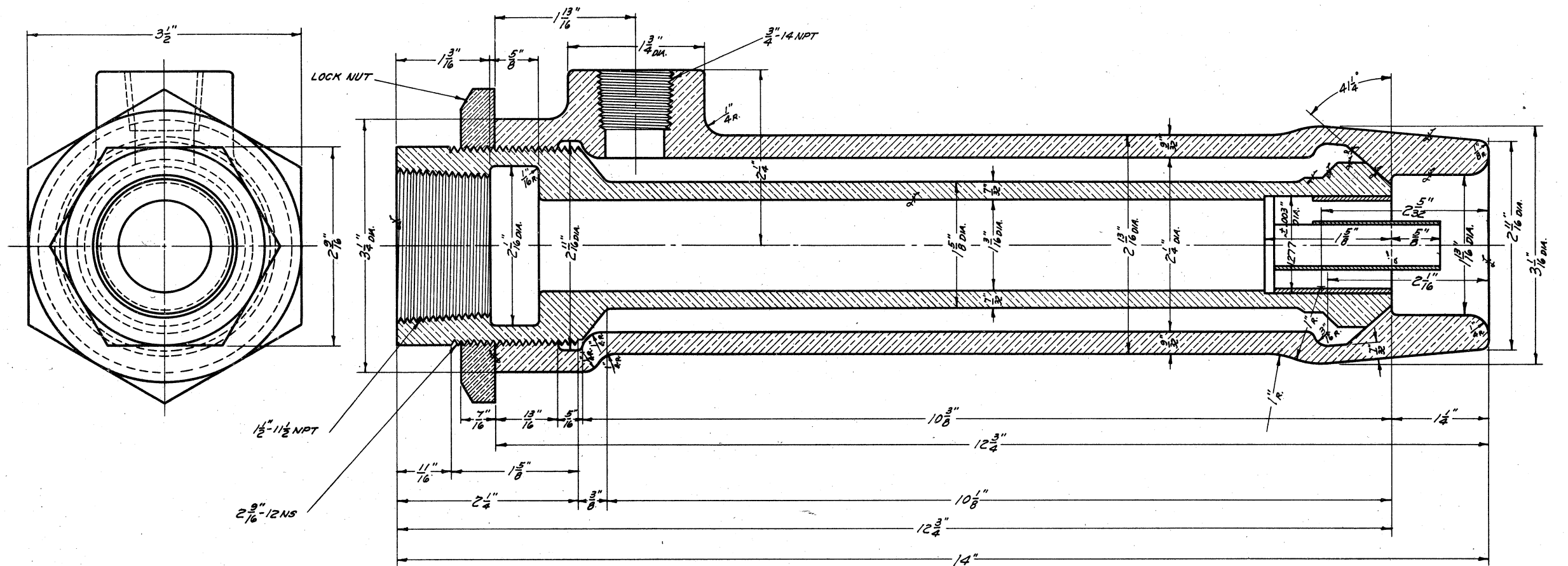
TEST RUN NOS	DIMENSION A
1-20, INCL.	1"
21 & 22	1 1/8"
23 & 24	1 1/4"
27-36, INCL.	1"
37 & 38	3/8"
39 & 40	1"

## SMOKEBOX ARRANGEMENT

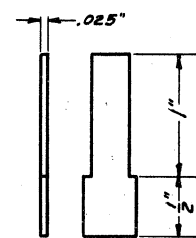
ENGINE SP-4401

CLASS GS-1

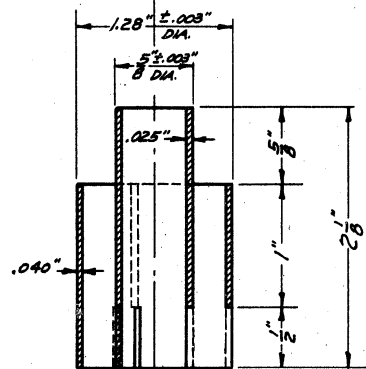
FIG. 2



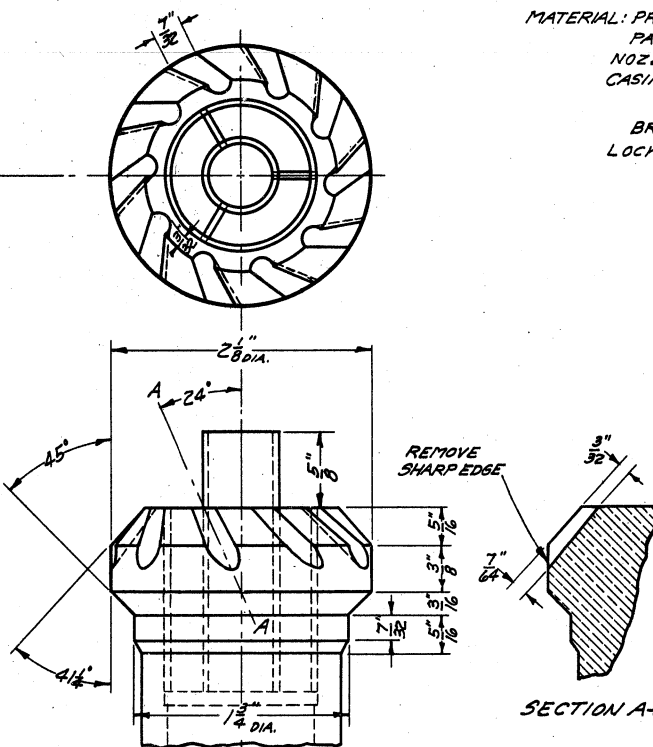
LOW TEMPERATURE  
HARD SOLDER, CONTINUOUS



INSERT FIN



NOZZLE INSERT  
MATERIAL: SHEET, HALF HARD BRASS  
TUBING; DRAWN BRASS, ALLOY #2, ASTM B-175



NOZZLE END

MATERIAL: PRESSURE BRONZE SPEC CS-12  
PATTERN NUMBERS:  
NOZZLE - LB 13273  
CASING - LB 13274  
  
BRASS:  
LOCK NUT LB 13279

PATENT PENDING

USED ON LOCOMOTIVES- CLASSES	
69-1,2,3,4,5,6	1

SOUTHERN PACIFIC LINES  
COMMON STANDARD  
GYROJET OIL BURNER

SCALE: 1/2 IN. = 1 FT. DATE: NOVEMBER 10, 1950.

GROUP 60	
BL 101820	

AL 10592 E & AL 14747 C, & BL 10816 F.

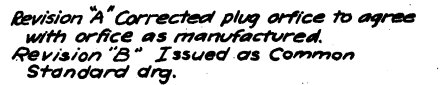
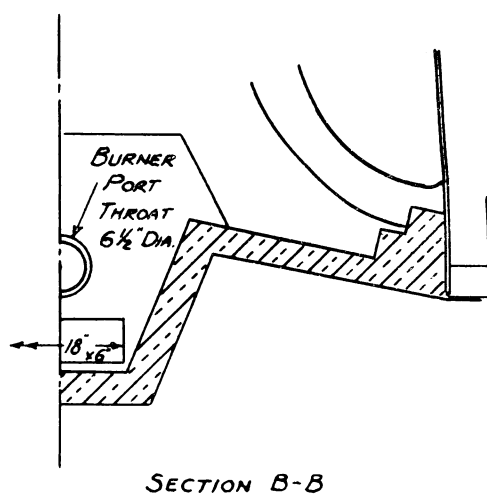
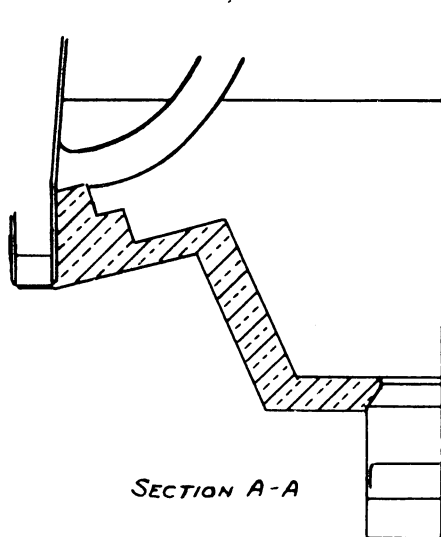
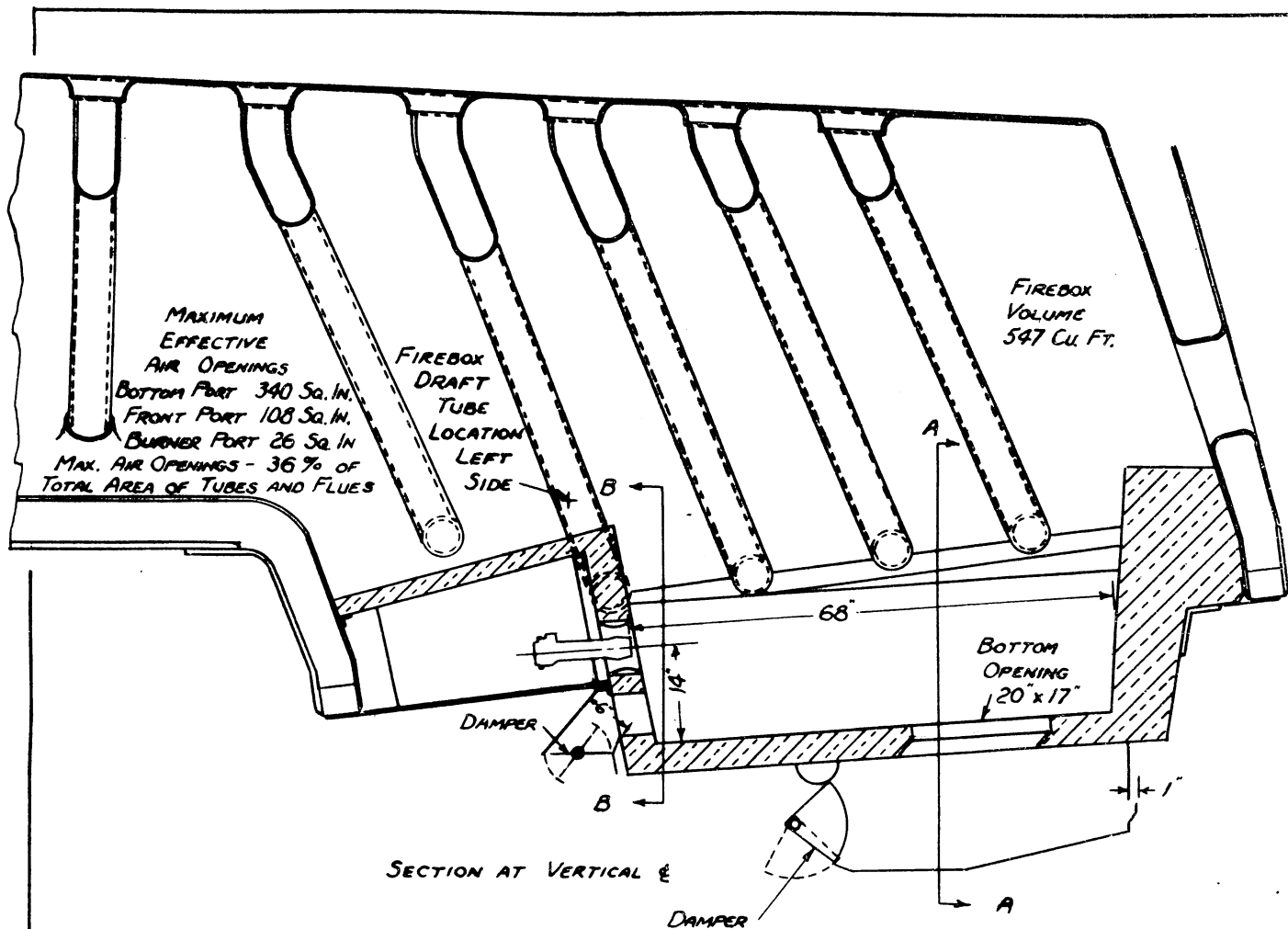


FIGURE 4

[illegible]

**h.h.h.**





# **FIREPAN ARRANGEMENT, RUNS 1-24 WITH CIRCULATORS**

ENGINE SP-4401

CLASS GS-1

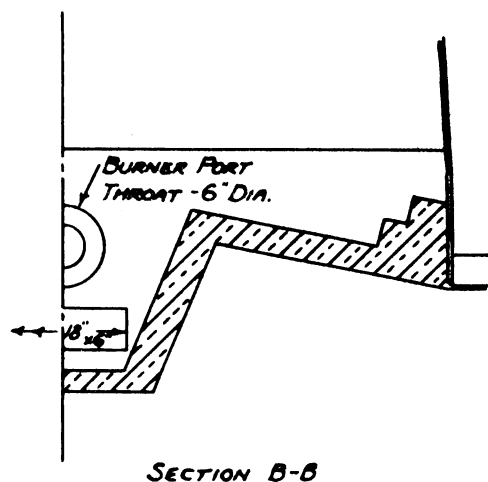
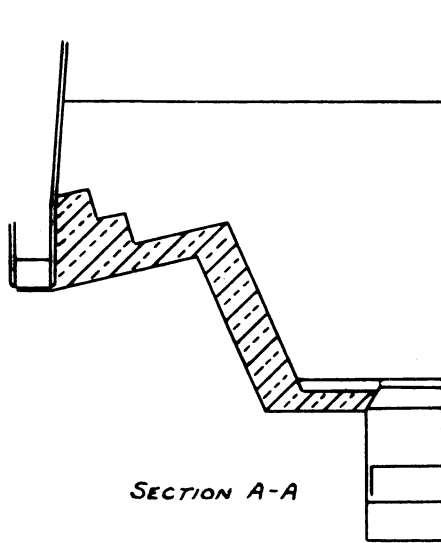
FIG. 5

MAXIMUM EFFECTIVE  
 AIR OPENINGS  
 BOTTOM PORT 315 SQ. IN.  
 FRONT PORT 108 SQ. IN.  
 BURNER PORT 21 SQ. IN.  
 MAX. AIR OPENINGS - 34% OF  
 TOTAL AREA OF TUBES AND FLUES

FIREBOX VOLUME  
 542 CU. FT.

FIREBOX DRAFT  
 TUBE LOCATION  
 LEFT SIDE

SECTION AT VERTICAL E

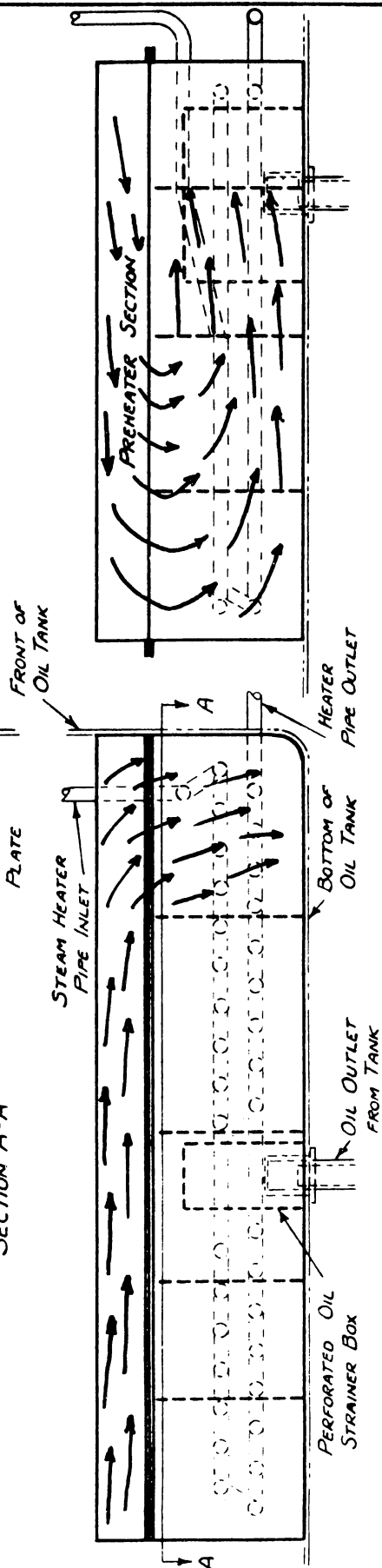
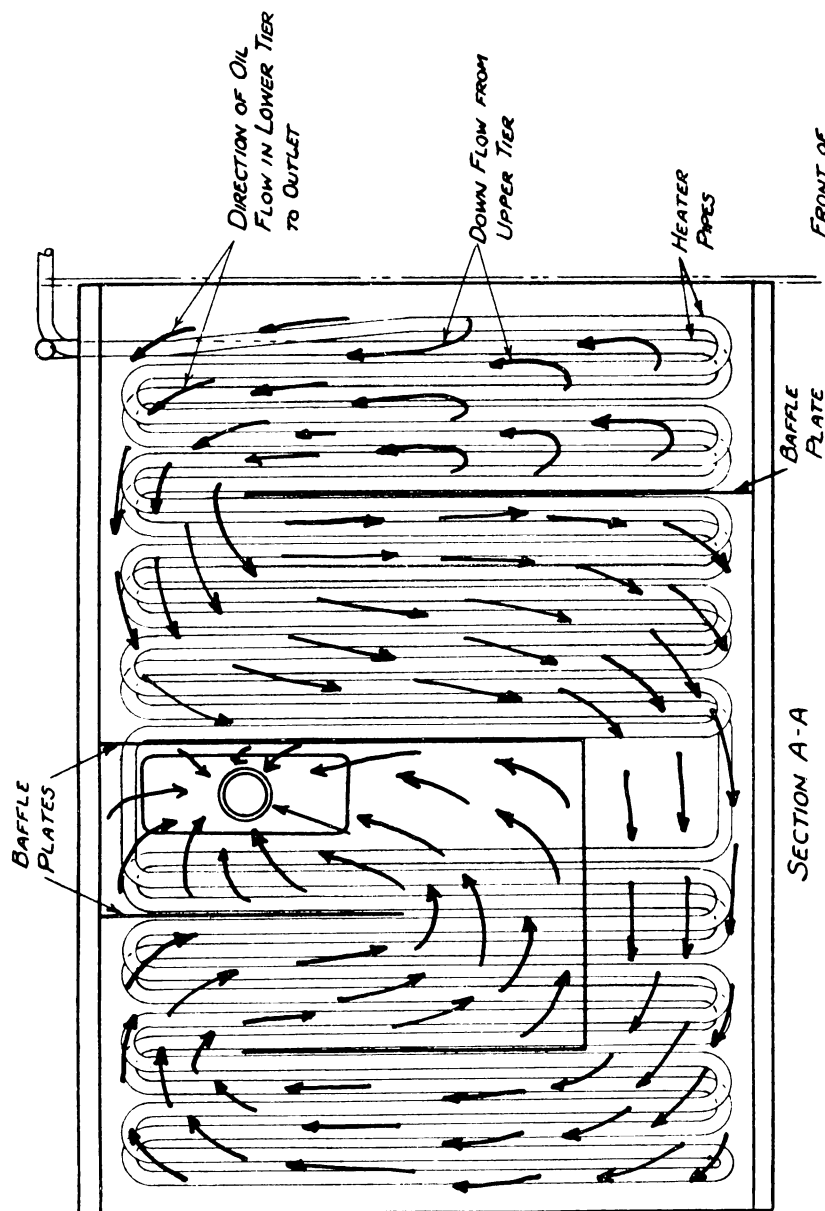


# FIREPAN ARRANGEMENT, RUNS 27-40 WITHOUT CIRCULATORS

ENGINE SP-440I

CLASS GS-1

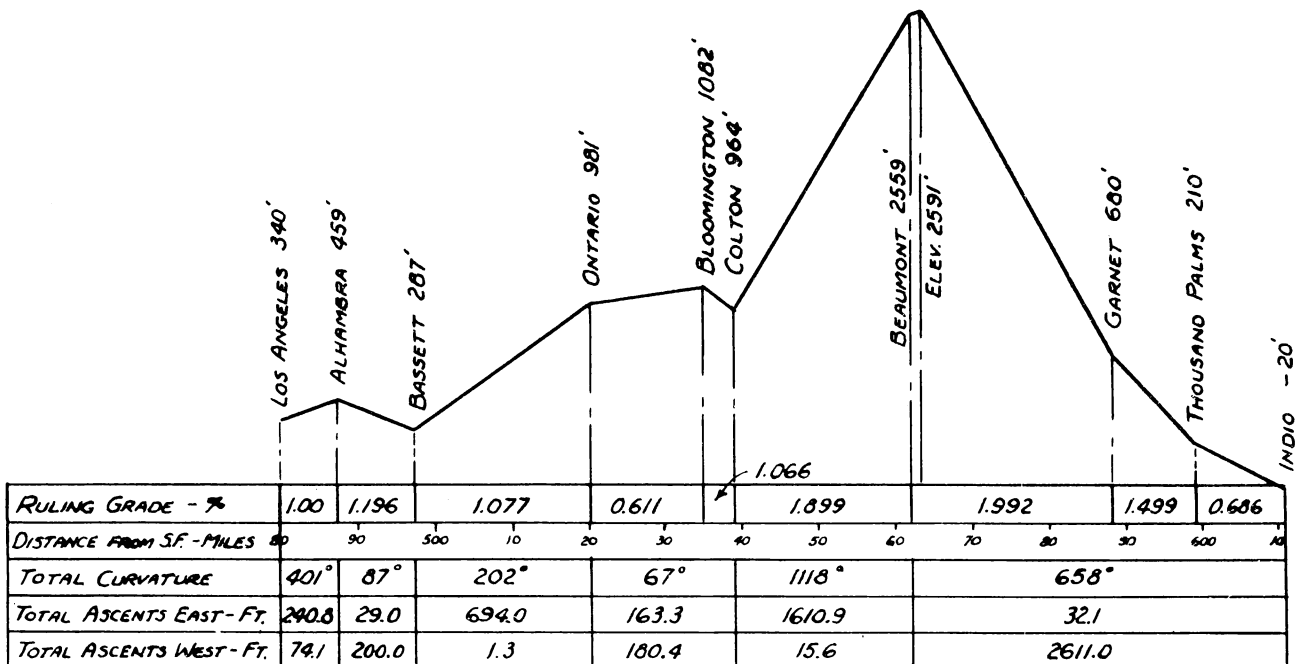
FIG. 6



**IMPROVED OIL TANK HEATER (BAFFLE TYPE)**

FIG. 7

HORIZONTAL SCALE 1" = 24 MILES  
 VERTICAL SCALE 1" = 1000 FEET

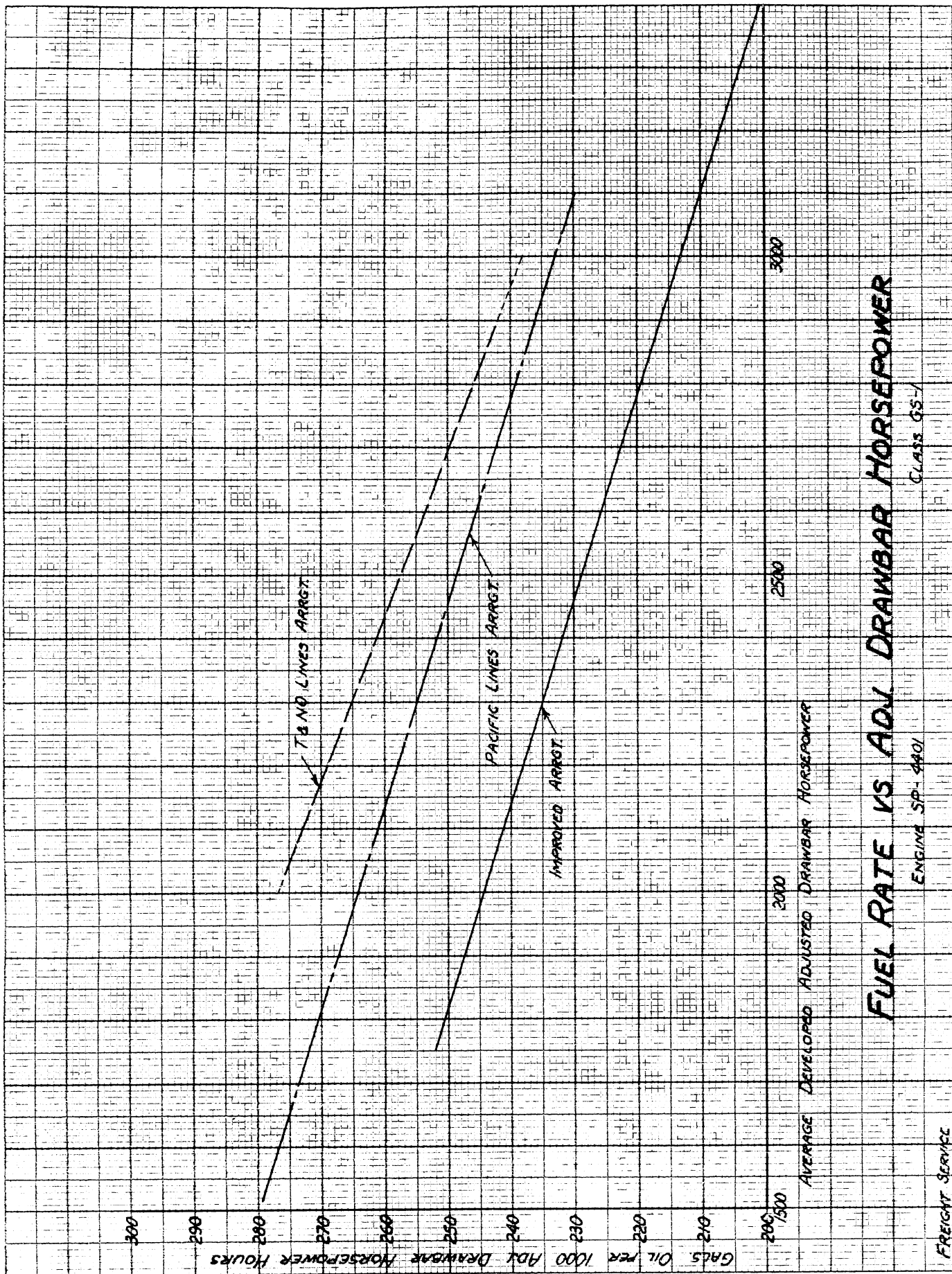


## PROFILE OF ROAD

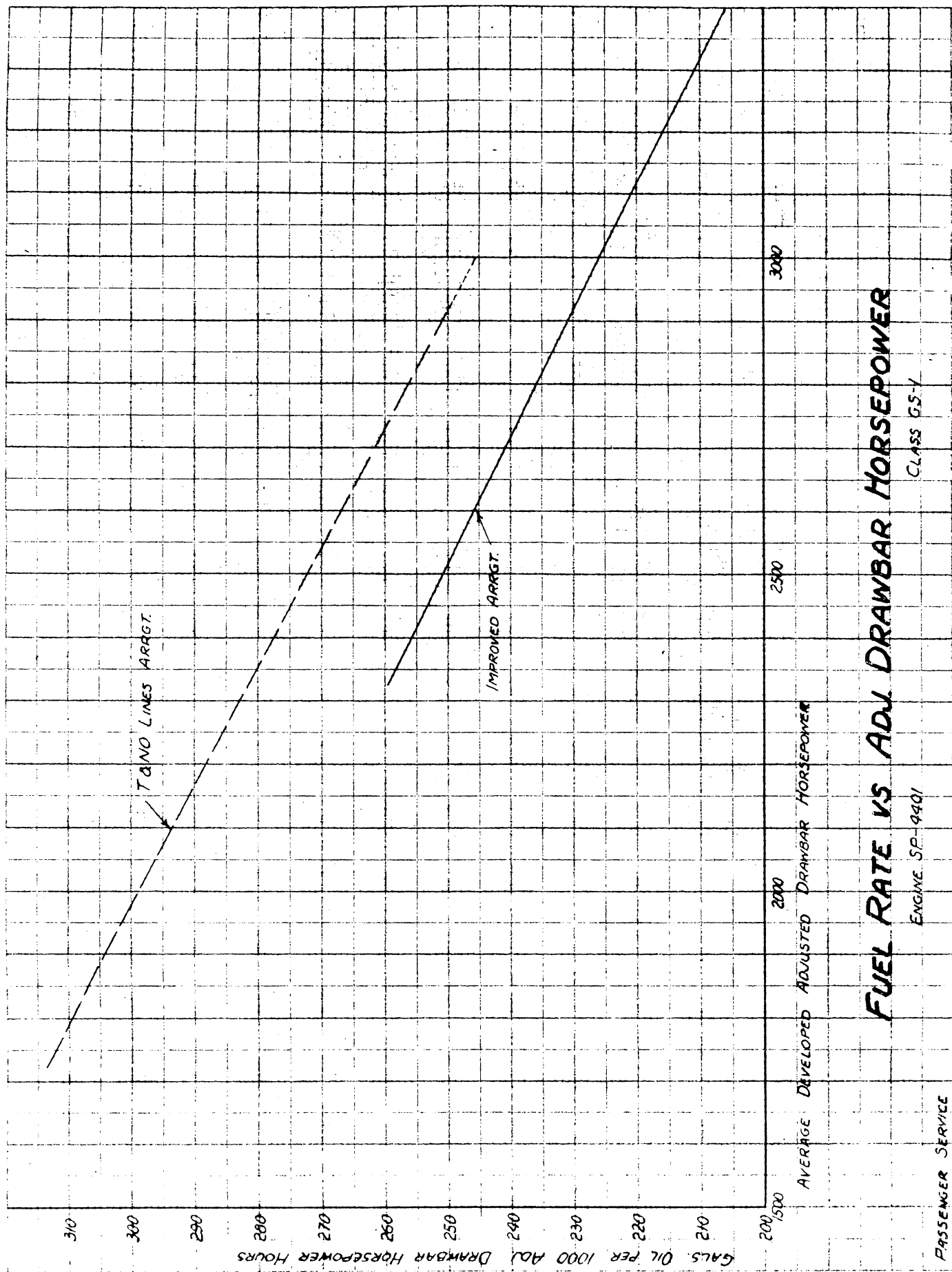
LOS ANGELES YARD TO INDIO

FIG. 8





GRAPH 1



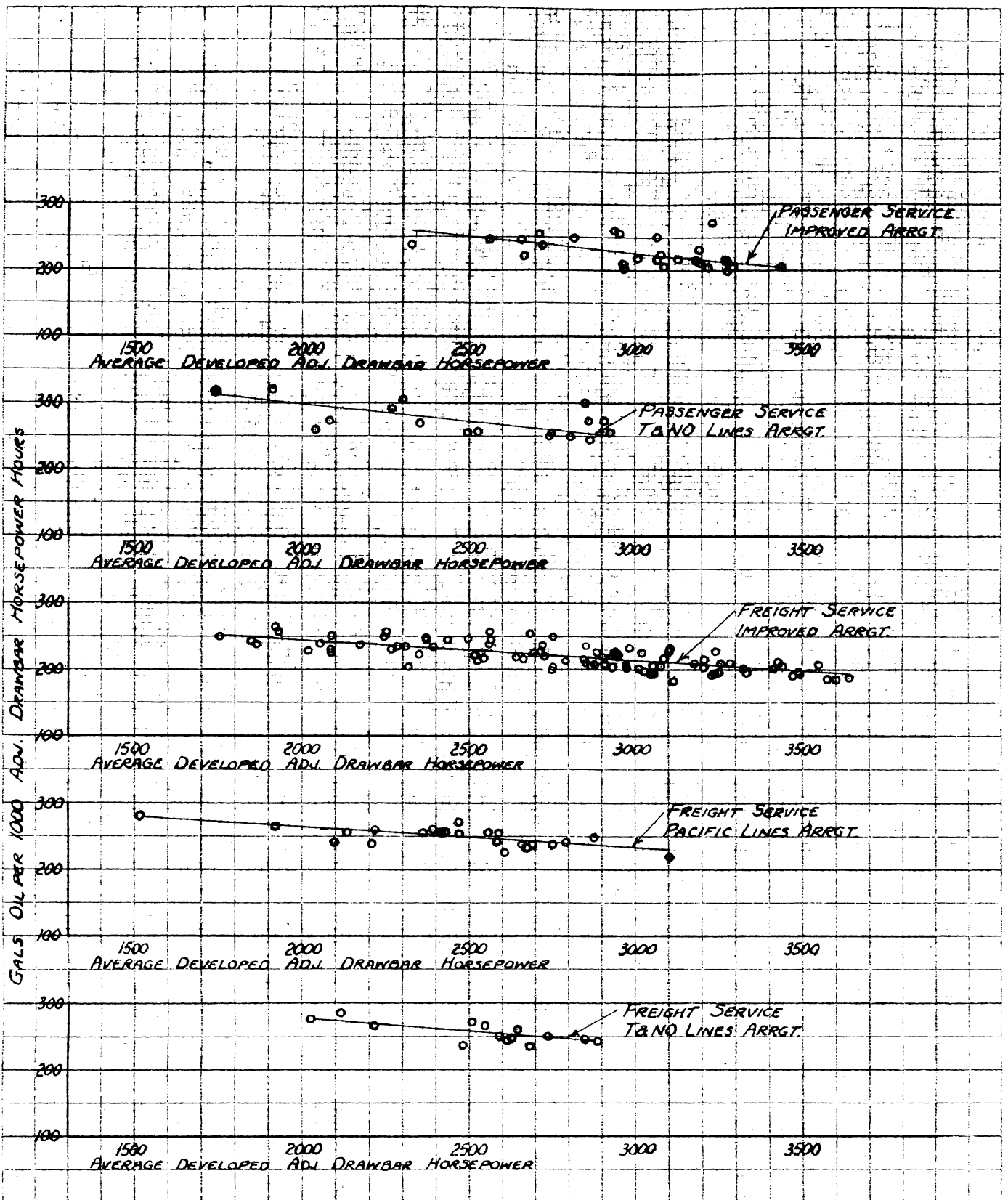
GRAPH 2

# FUEL RATE VS ADJ DRAWBAR HORSEPOWER

CLASS GS-V

ENGINE SP-9401

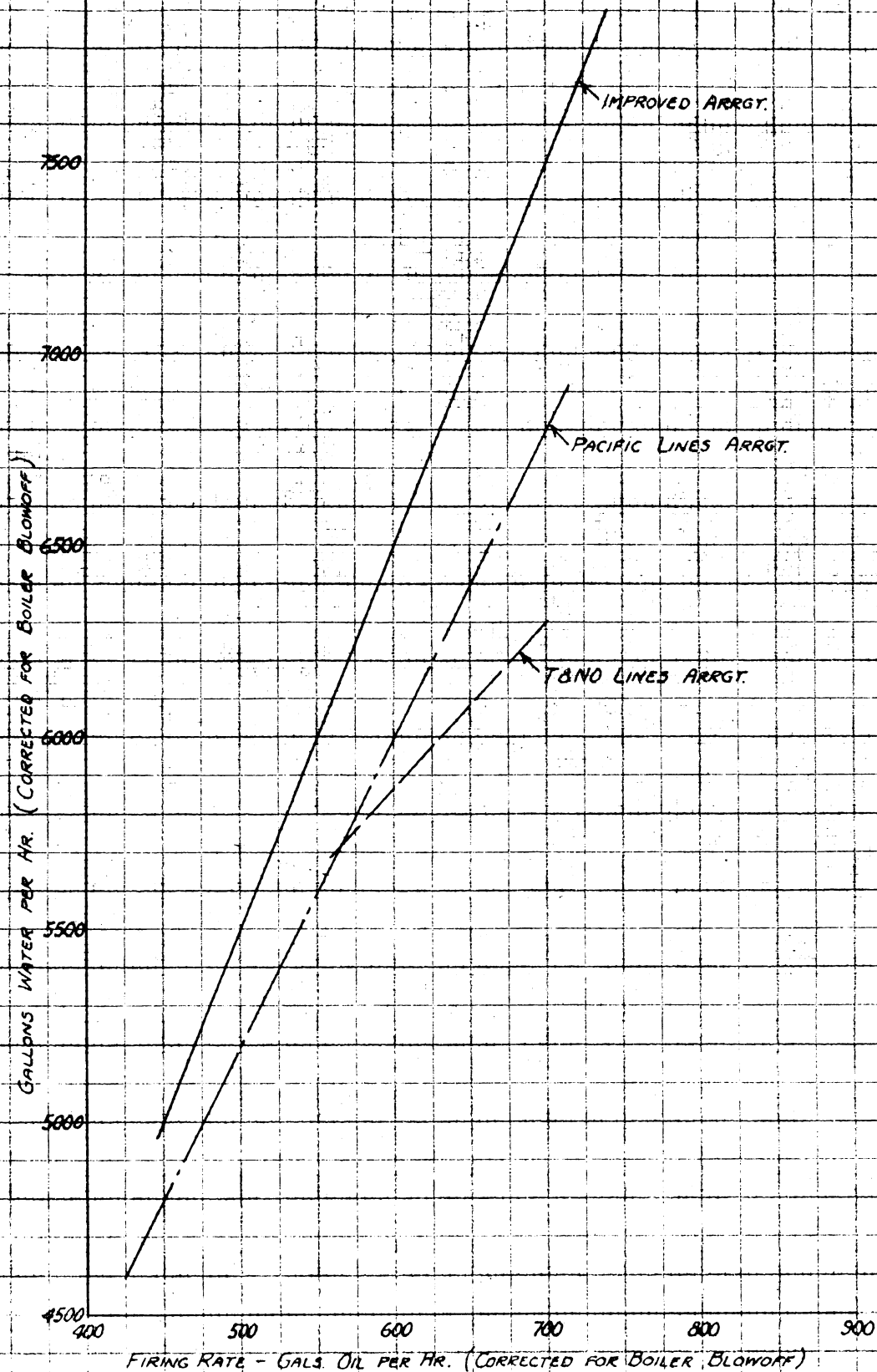
PASSENGER SERVICE



## FUEL RATE VS ADJ. DRAWBAR HORSEPOWER

ENGINE SP-4401

CLASS GS-1



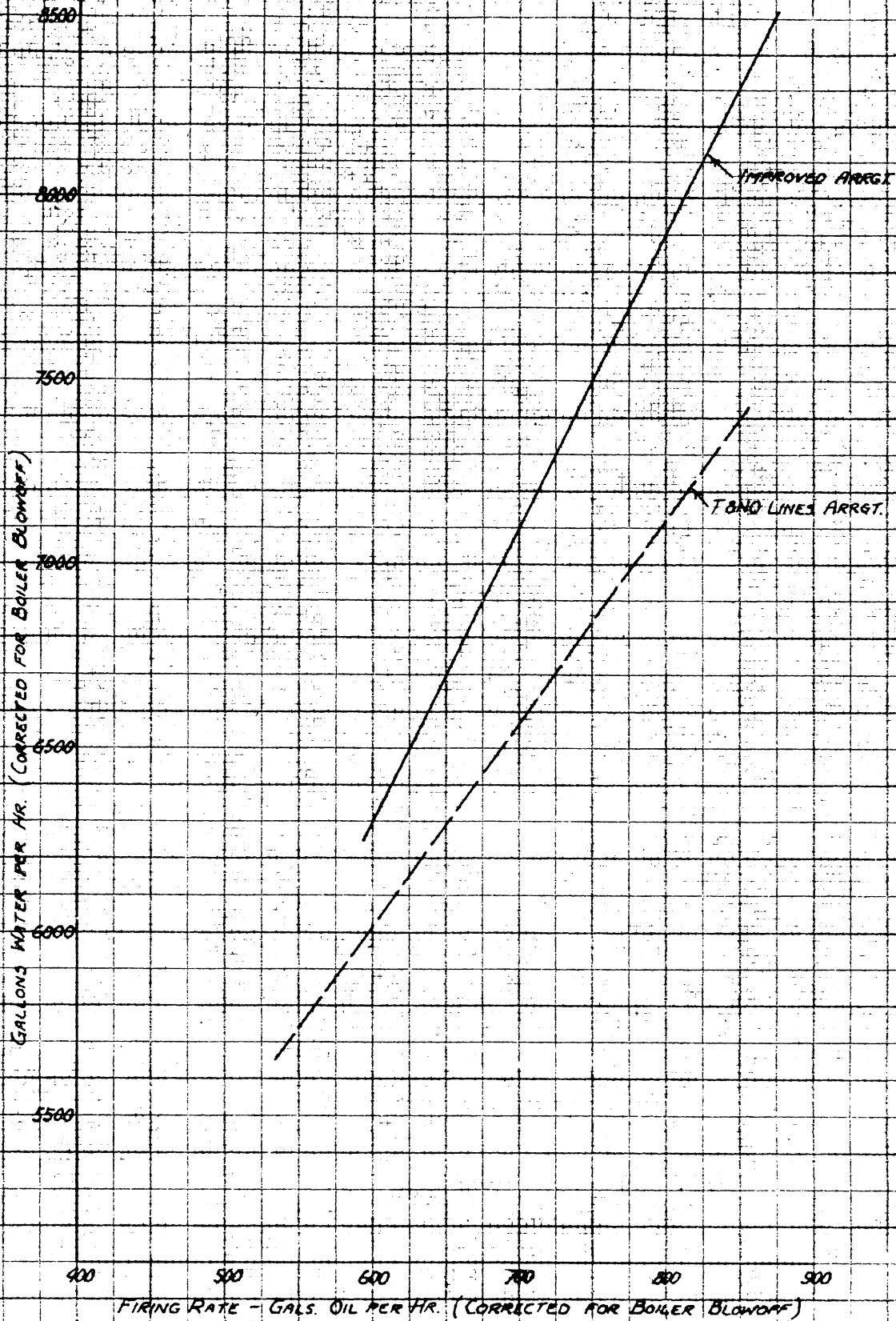
## WATER FROM TENDER VS ADJ. DRAWBAR HORSEPOWER

ENGINE SP-4401

CLASS GS-1

FREIGHT SERVICE



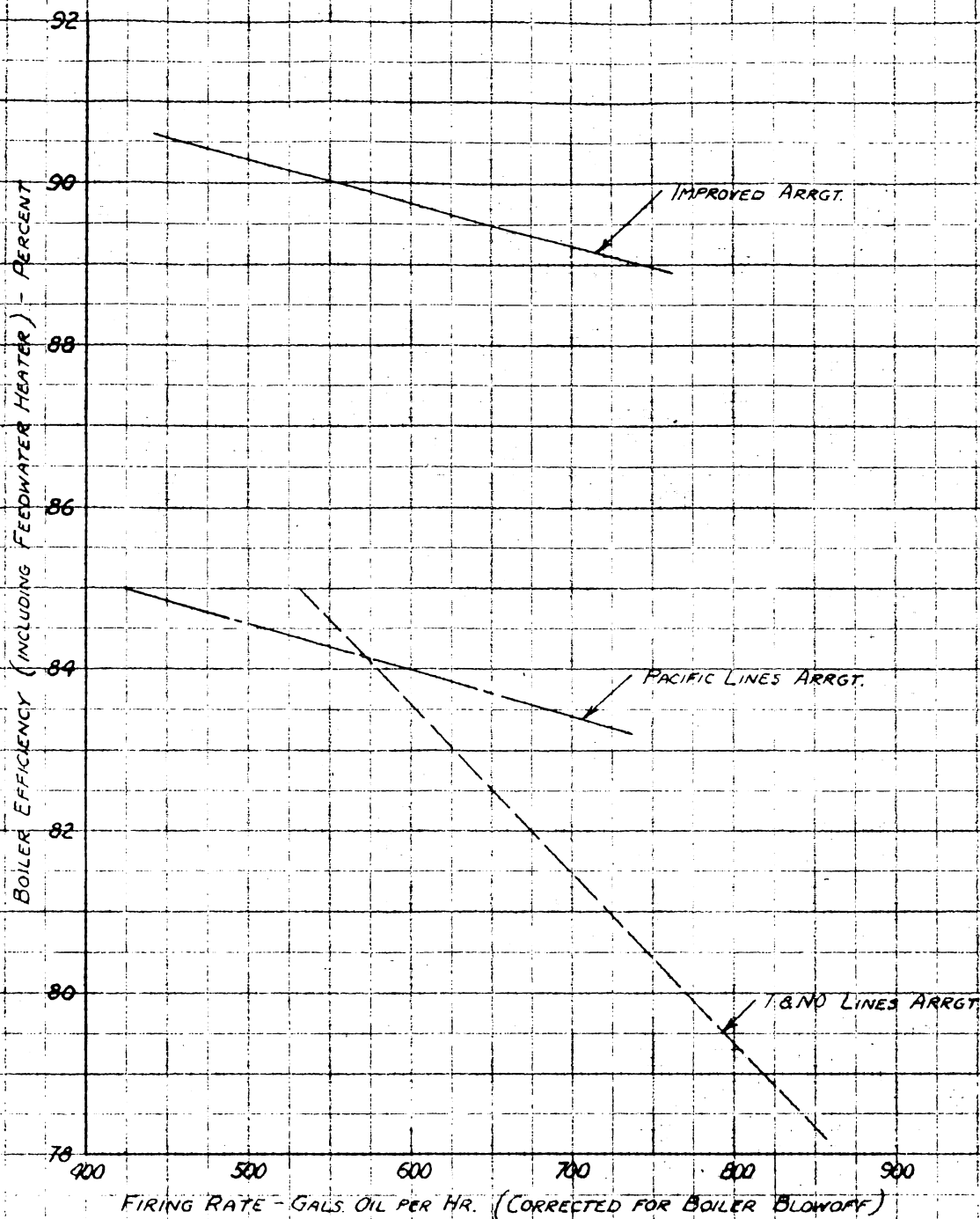


## WATER FROM TENDER VS ADJ DRAWBAR HORSEPOWER

ENGINE SP-4401

CLASS GS-1

PASSENGER SERVICE

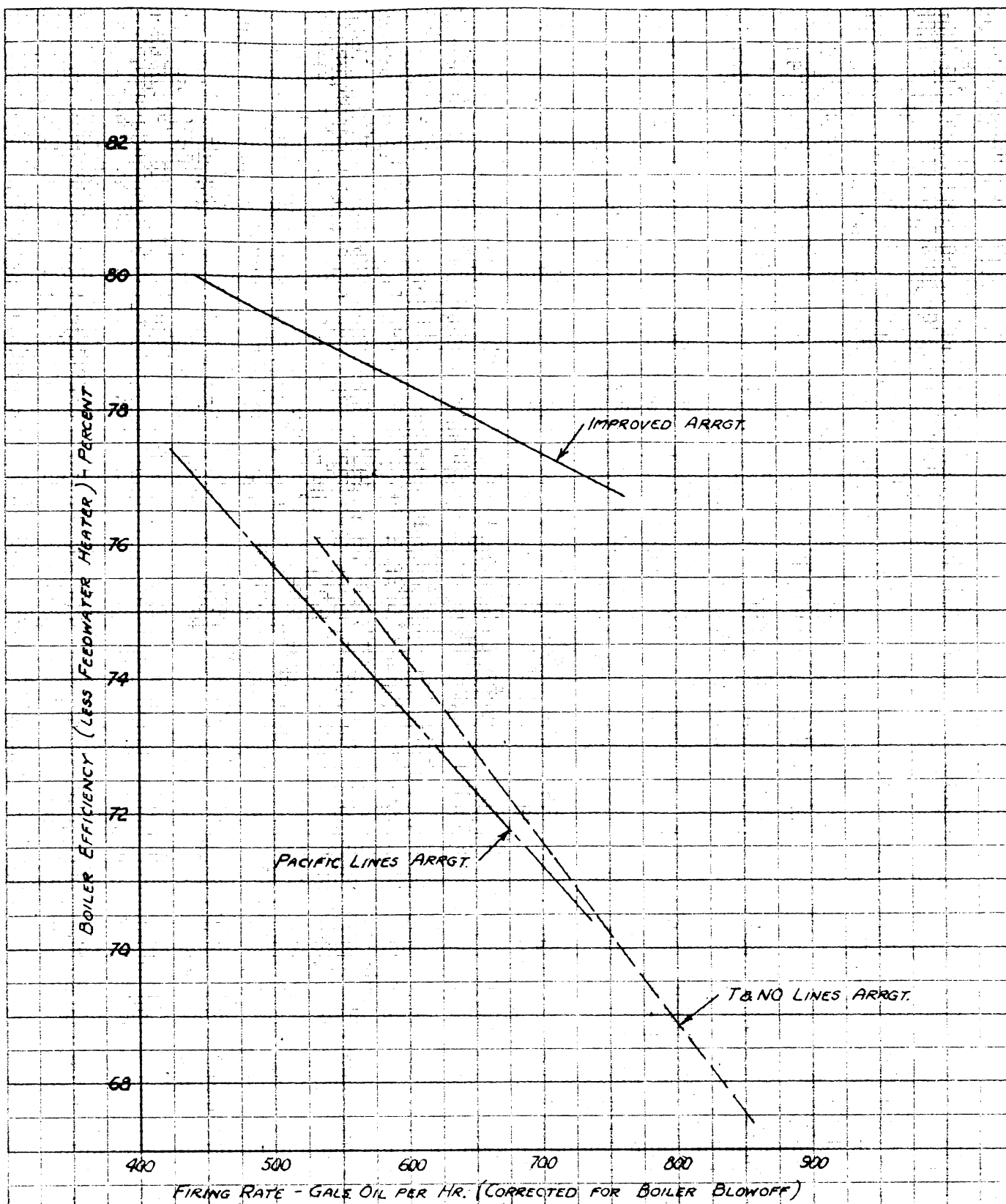


## BOILER EFFICIENCY (INC. FWH) VS FIRING RATE

PASSENGER &  
FREIGHT SERVICE

ENGINE SP-9401

CLASS GS-1

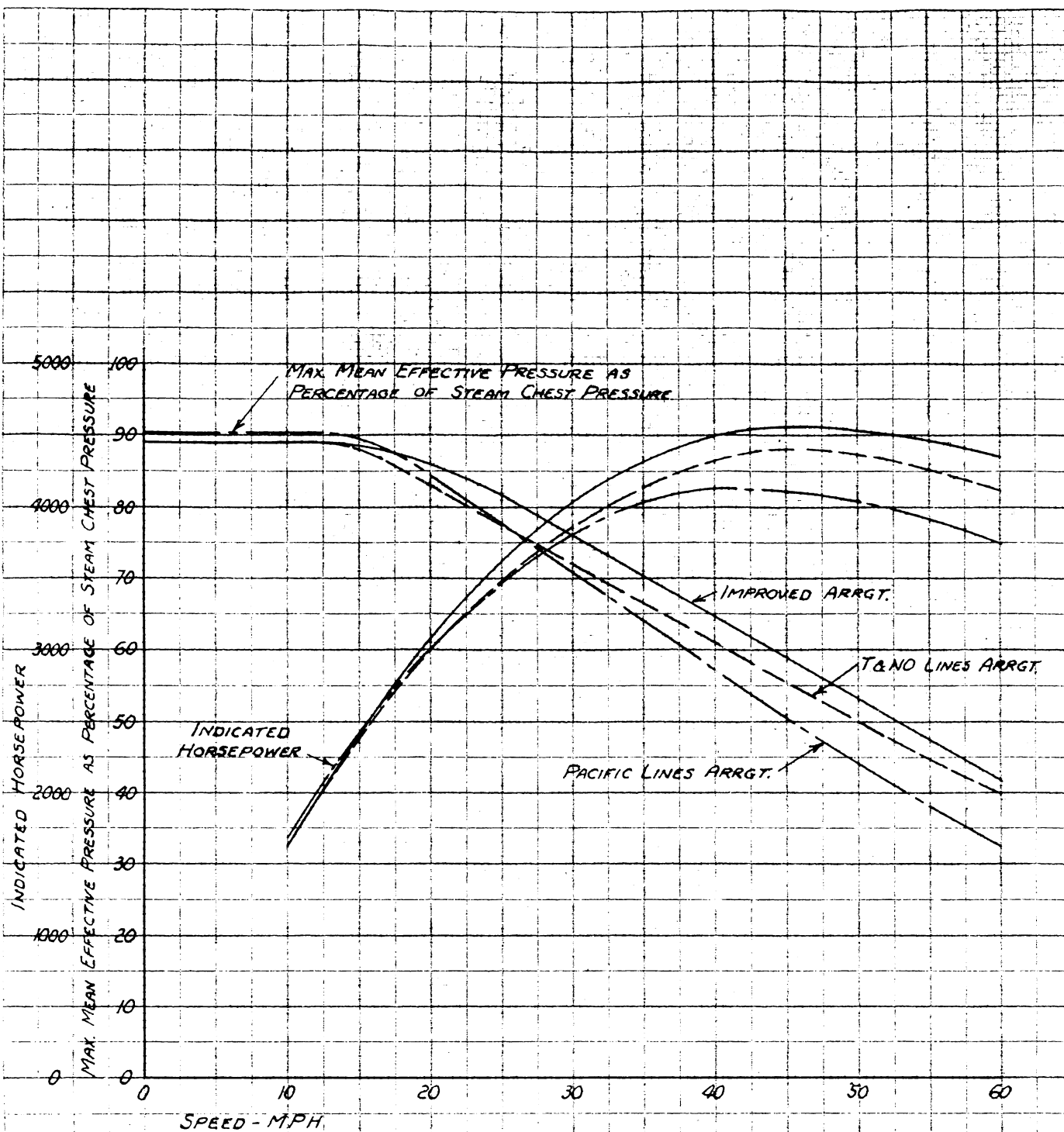


## BOILER EFFICIENCY (LESS FWH) VS FIRING RATE

PASSENGER &  
FREIGHT SERVICE

ENGINE SP-4401

CLASS GS-1

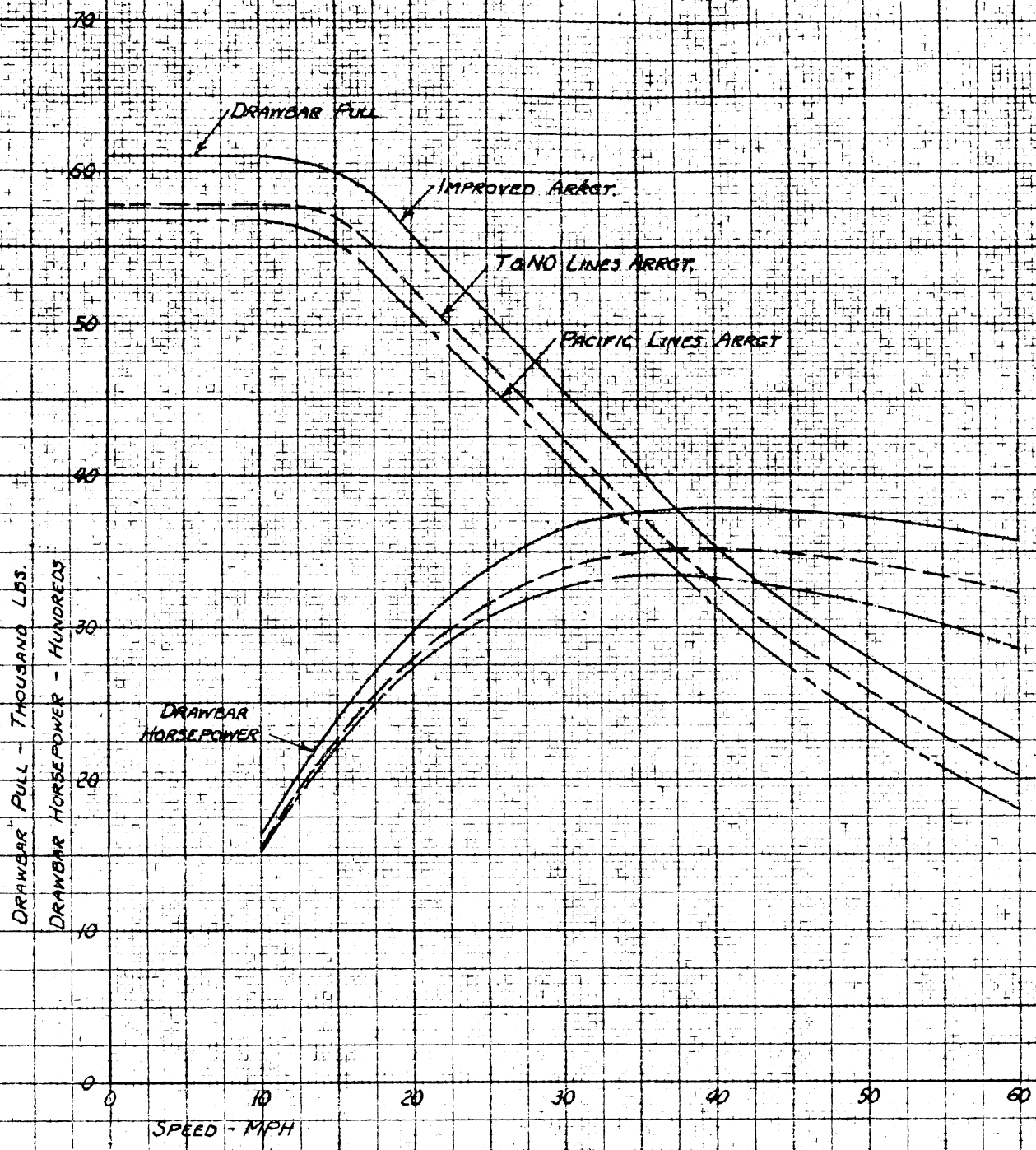


**MAX. MEAN EFFECTIVE PRESSURE  
AS PERCENTAGE OF STEAM CHEST PRESSURE  
AND INDICATED HORSEPOWER VS SPEED**

ENGINE SP-4401

CLASS GS-1

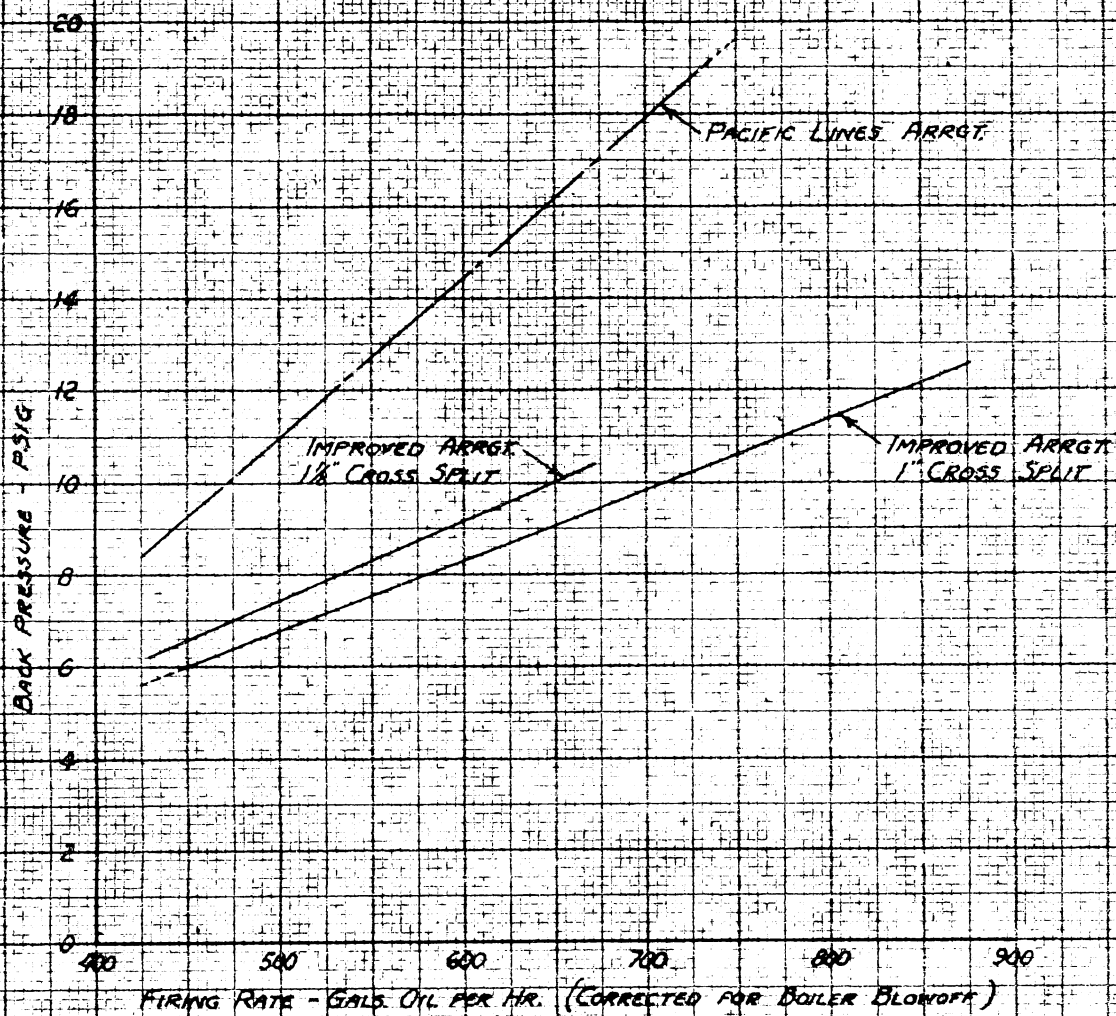




# MAXIMUM DRAWBAR PULL AND DRAWBAR HORSEPOWER VS SPEED

ENGINE SP-4401

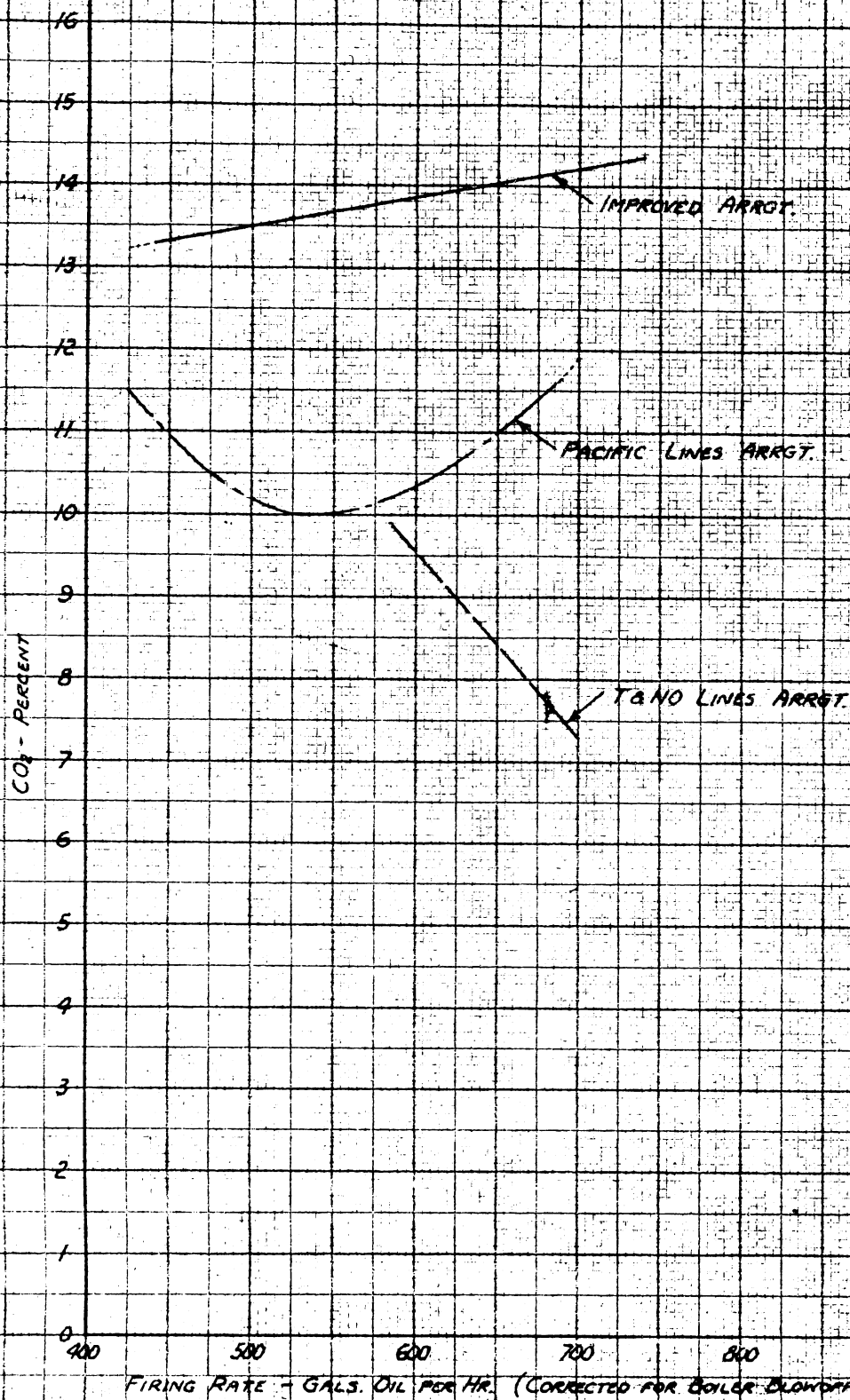
CLASS GS-1



## BACK PRESSURE VS FIRING RATE

ENGINE SP-4401

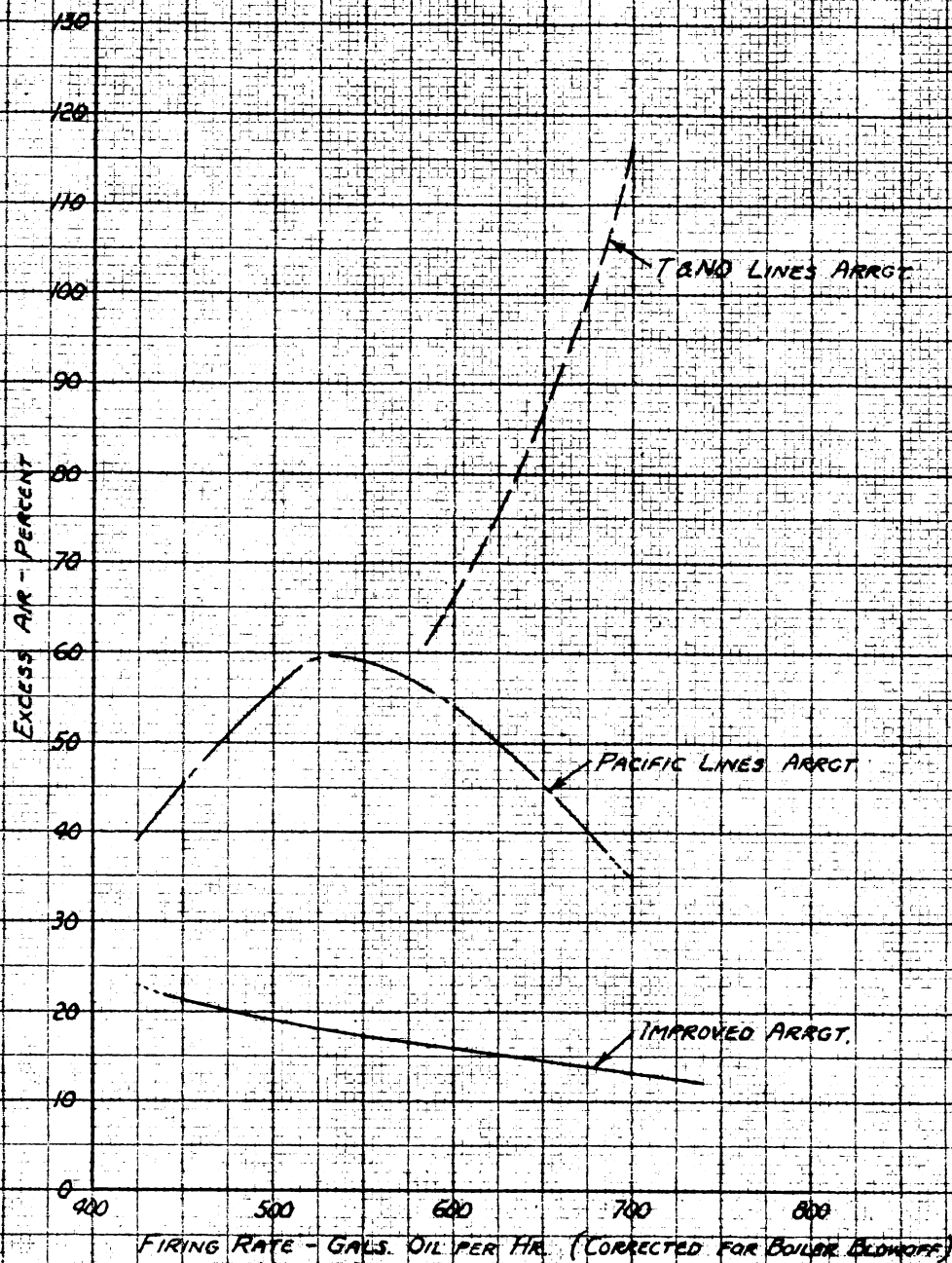
CLASS GS-1



## CO<sub>2</sub> VS FIRING RATE

ENGINE SP-4401

CLASS G3-1

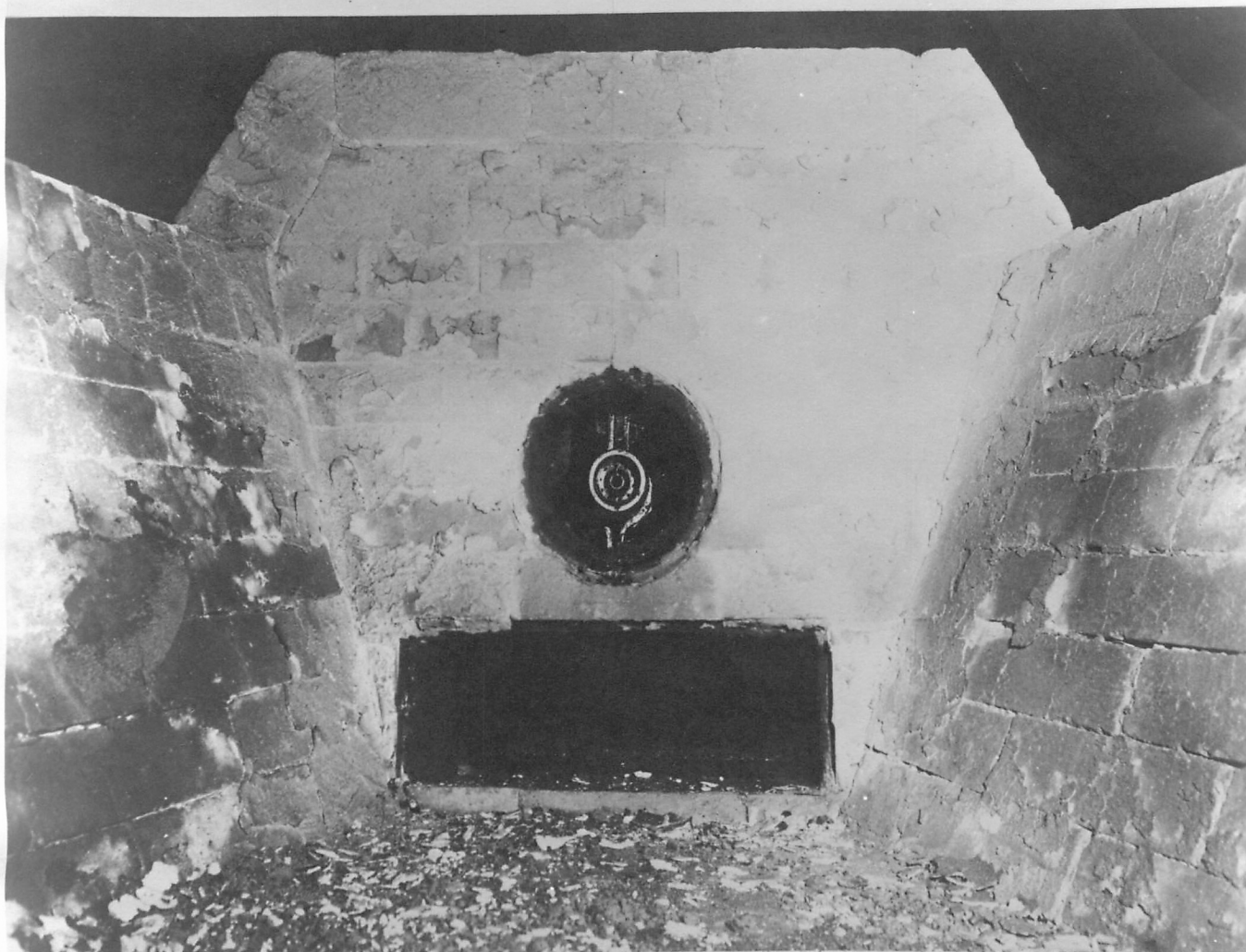


## EXCESS AIR VS FIRING RATE

ENGINE SP-4401

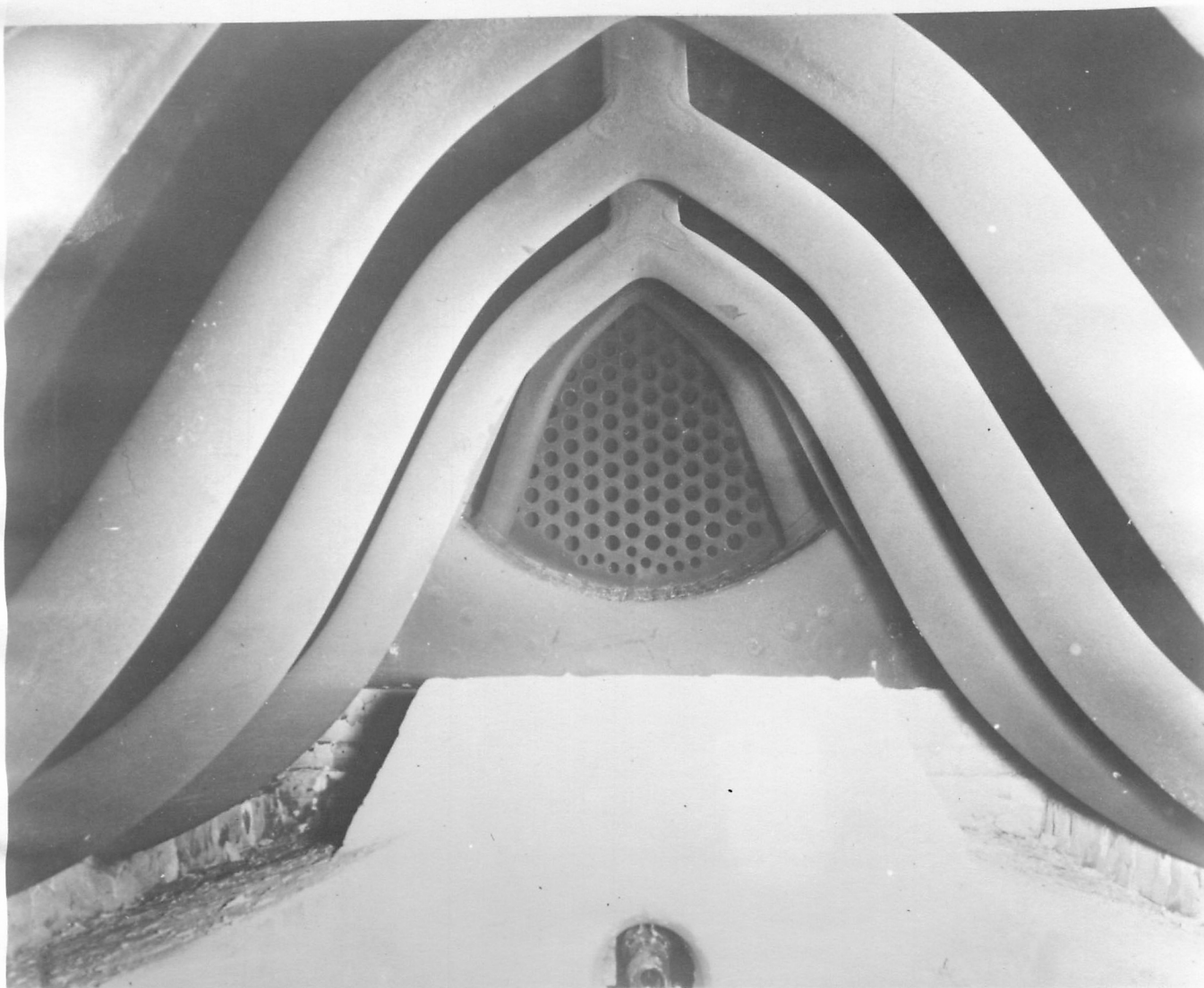
CLASS GS-1





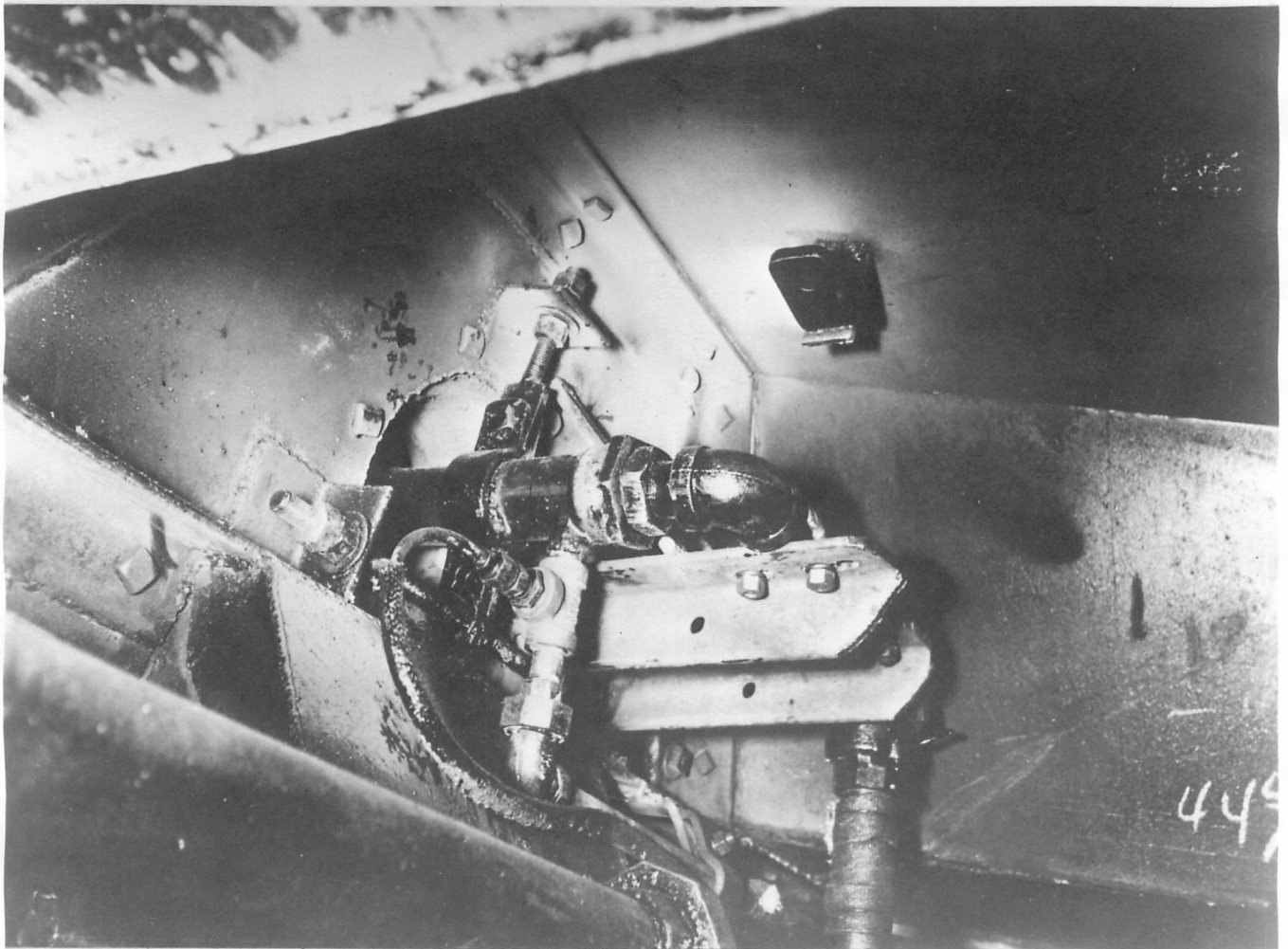
Gyrojet oil burner installation in Venturi shaped burner port.

Photo No. 1



Security circulator installation in firebox and combustion chamber.

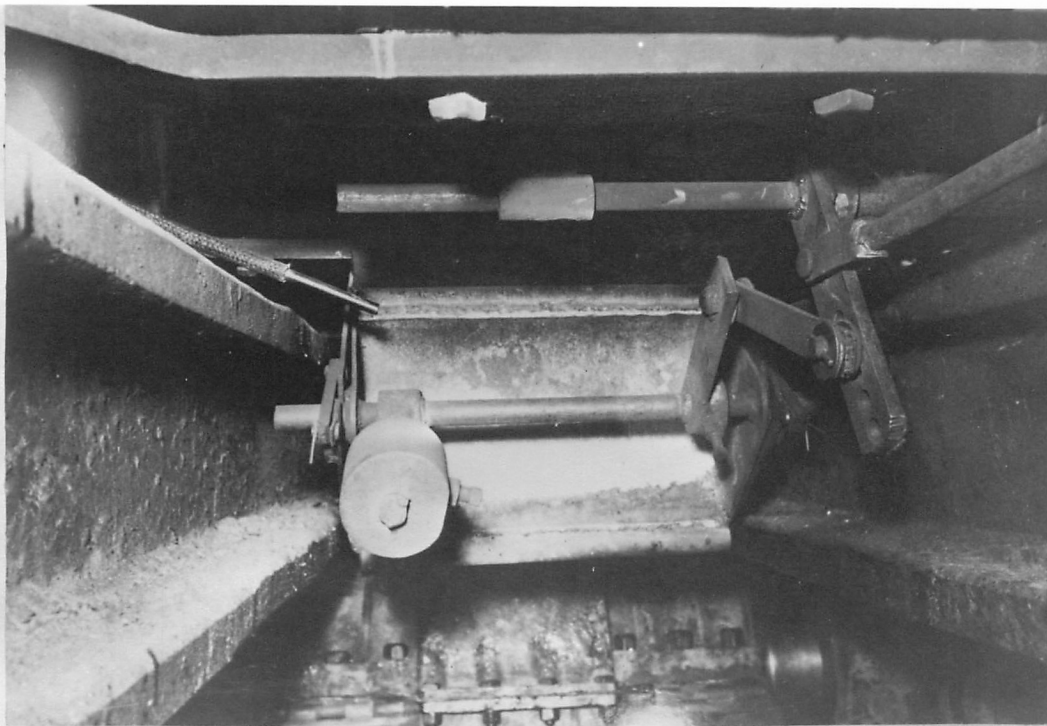
Photo No. 2



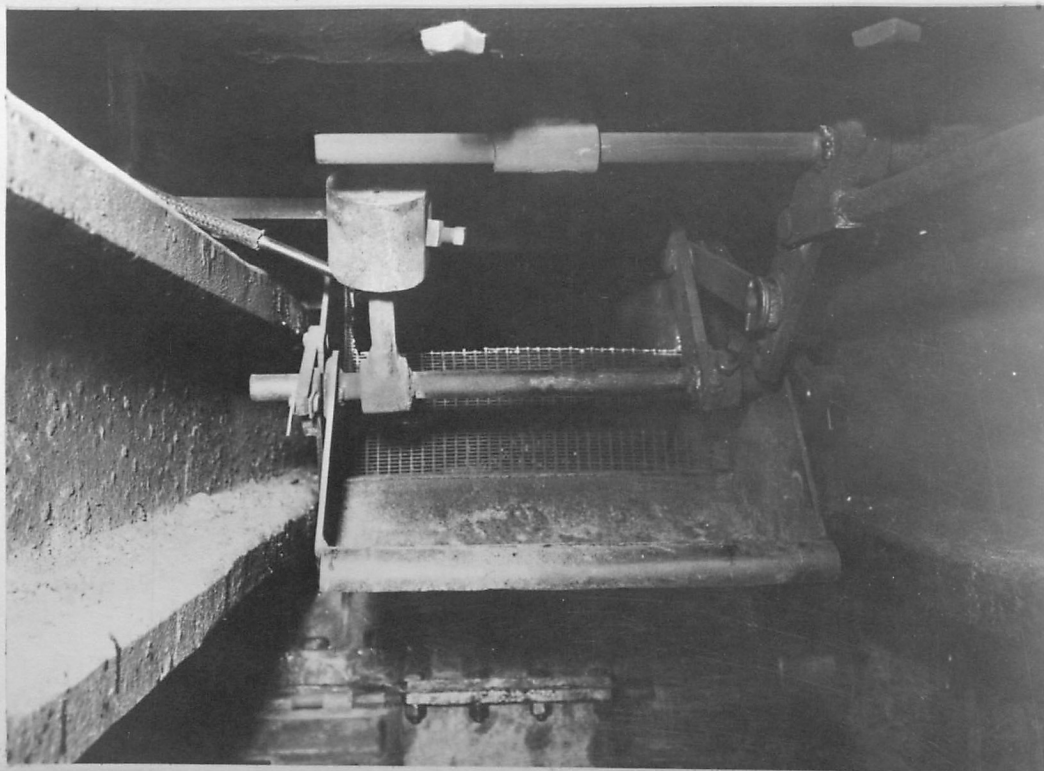
Method of application to firepan of Gyrojet oil burner.

Photo No. 3



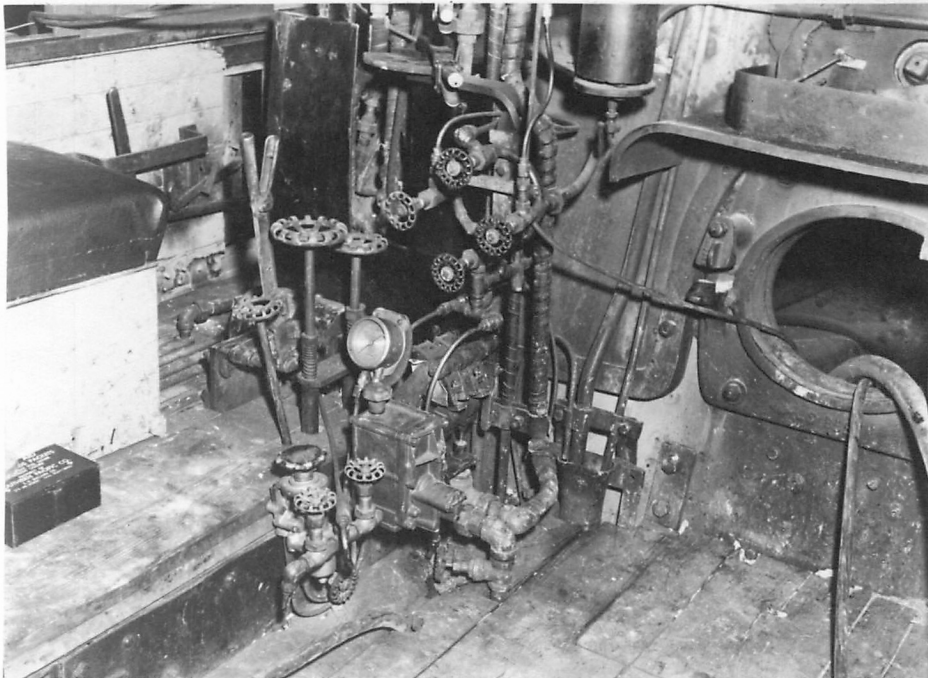


Hopper damper (closed position) and operating levers.

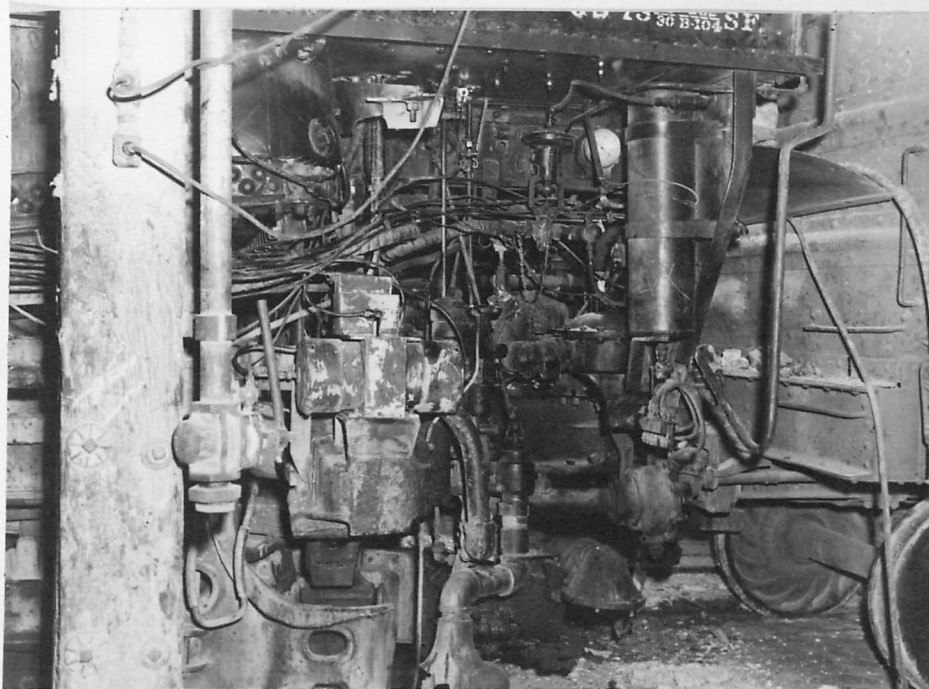


Hopper damper (open position) and operating levers, showing application of screen in hopper.

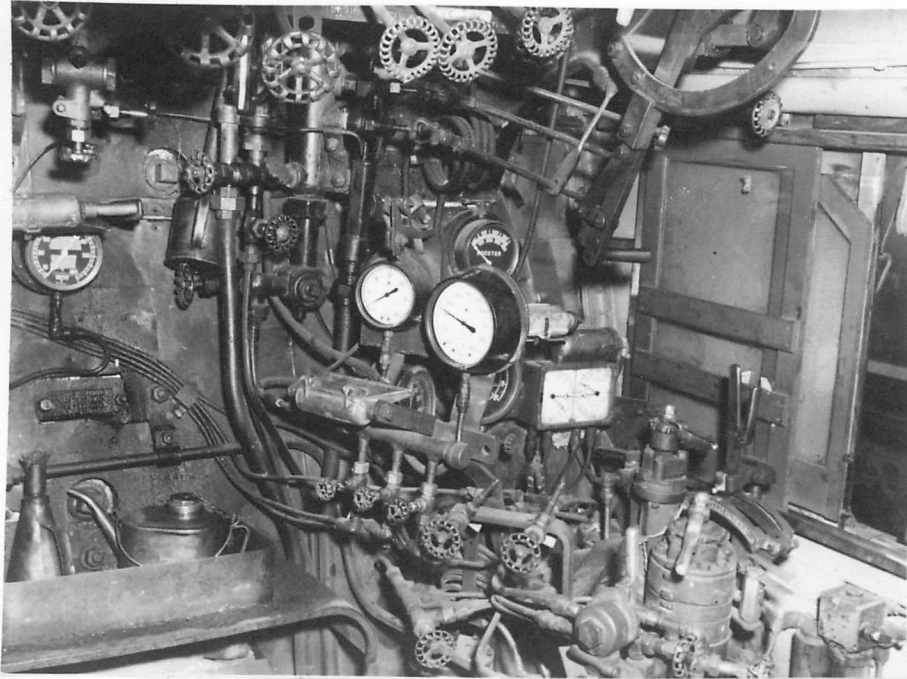




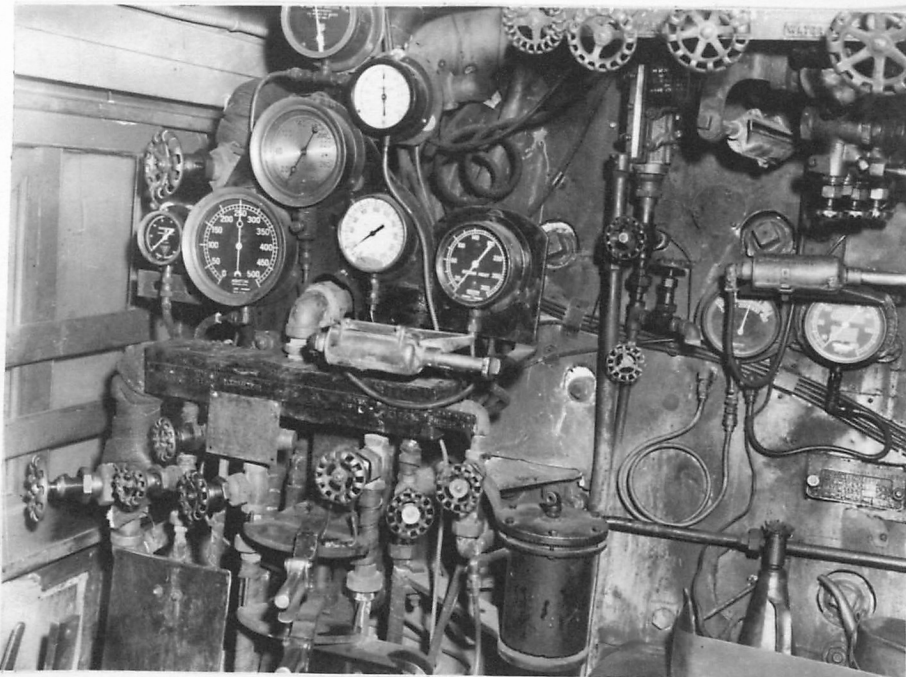
Westinghouse Pacific Coast Brake Company's automatic firing control installation on deck of cab at fireman's side.



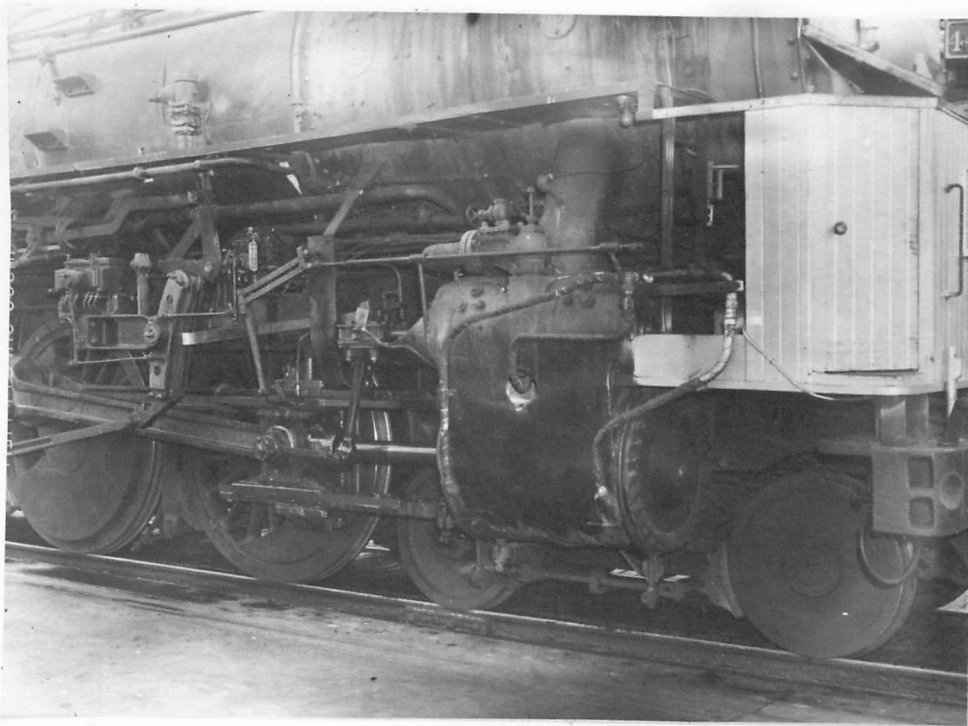
Westinghouse Pacific Coast Brake Company's automatic firing control installation below deck of cab on fireman's side.



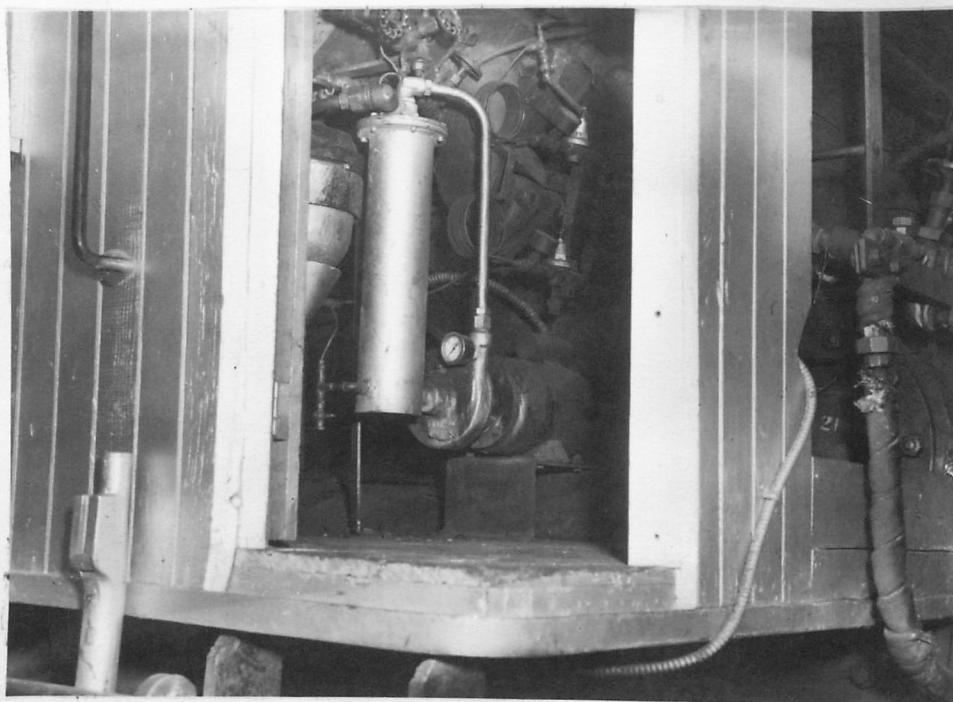
Engineer's side of cab showing engineer's controls, test gages, and test gage manifold.



Fireman's side of cab showing fireman's controls and test gages.

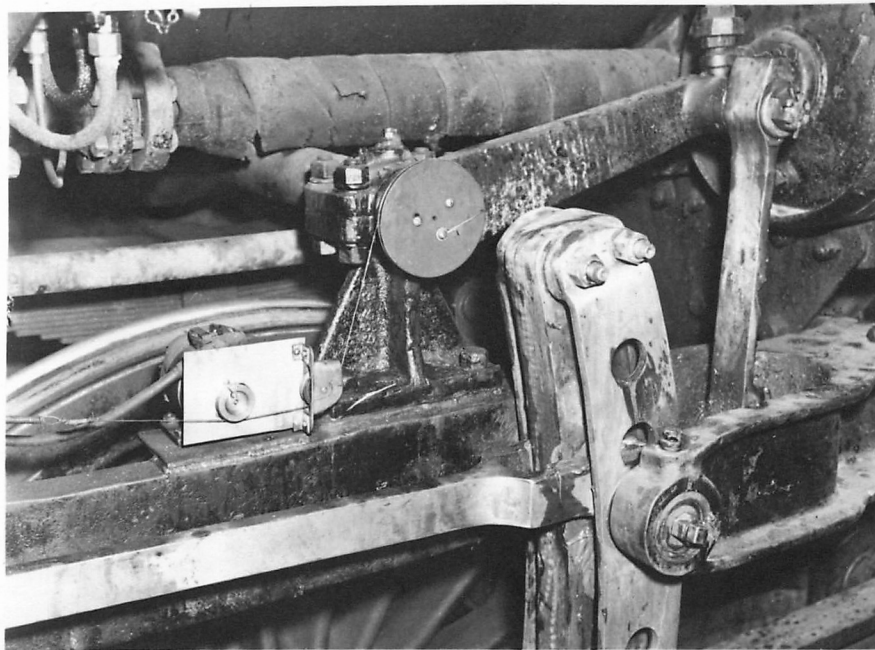


Indicator piping and reducing motion installation at right cylinder.



Flue gas aspirating motor and pump, washer and separator, inside pilot shelter.

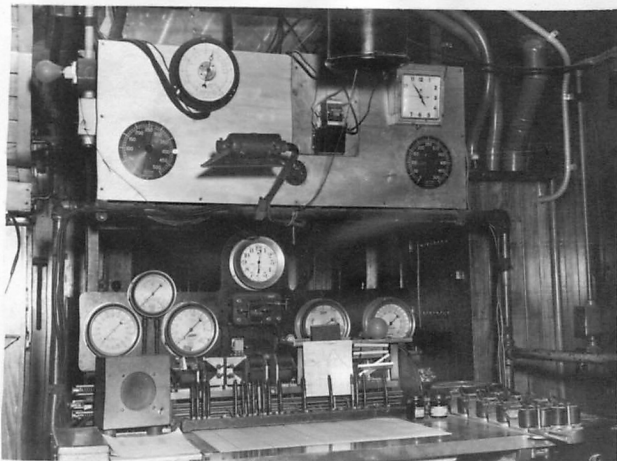




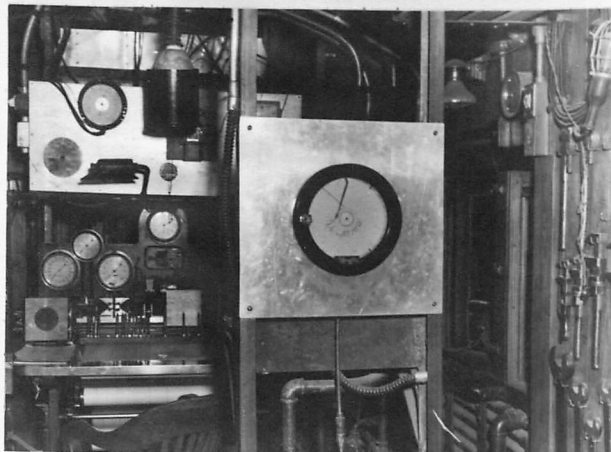
Cutoff position selsyn transmitter application to reverse shaft and transverse lever.



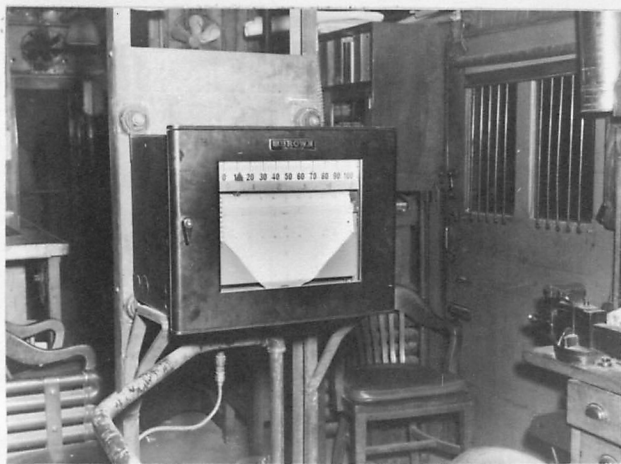
Throttle position selsyn transmitter application to roof of cab and throttle lever.



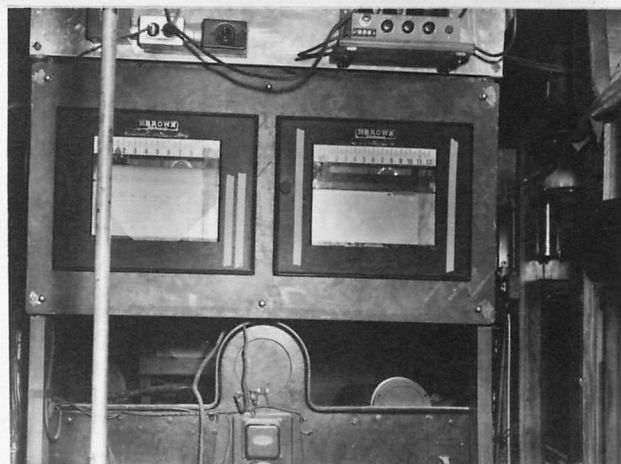
a) Chronograph table in dynamometer car with selsyn repeater panel above. Calibrated cutoff and throttle position dials at lower corners of panel.



b) Exhaust nozzle pressure recorder mounted on panel in dynamometer car.



c) Smoke density indicator recorder mounted on panel in dynamometer car.



d) Flue gas, oil tank, and waterside firebox sheet temperature indicator - recorders mounted on panel in dynamometer car.



SUMMARY DATA SHEET—RUNS 1-8

Run and Area No.	1E1	1E2	1E3	2W1	2W2	3E1	3E2	3E3	4W1	4W2	4W3	4W4	4W5	4W6	5E1	5E2	5E3	6W1	6W2	6W3	6W4	7E1	8W1	8W2	8W3	8W4
Length of Run - Miles	13.44	8.23	10.27	2.99	6.92	16.75	6.88	10.51	10.51	2.45	4.21	4.81	3.66	6.71	11.53	7.36	6.28	10.61	8.17	4.80	4.18	7.49	8.25	6.40	6.75	7.13
Running Time - Hrs.	0.45	0.30	0.50	0.25	0.40	0.50	0.20	0.35	0.25	0.25	0.25	0.50	0.25	0.25	0.30	0.30	0.40	0.25	0.35	0.25	0.25	0.35	0.20	0.25	0.25	0.35
Average Speed - MPH	29.87	27.43	20.54	11.96	17.30	33.5	30.75	19.11	42.04	9.80	16.84	9.62	14.64	26.84	38.43	24.53	15.70	42.40	23.34	19.20	16.72	21.40	41.25	25.60	27.00	20.37
Average Developed Adjusted DB Horsepower	3,193	3,013	2,734	1,764	2,325	3,362	3,270	2,611	3,227	1,308	2,231	1,465	2,106	2,661	3,003	2,515	2,016	3,256	2,677	2,671	2,350	2,700	2,481	2,723	2,789	2,665
Average Cutoff - %	60.5	60.4	65.7	67.9	73.3	61.1	59.6	73.3	48.3	73.3	73.3	73.3	73.3	62.1	46.0	54.1	66.9	47.7	64.6	72.2	71.3	69.2	41.2	59.3	57.7	70.6
No. Loaded Cars, incl. Test Cars				22	22	31	19	19	24	24	24	24	24	24	28	6	6	16	16	16	16	12	20	20	20	20
No. Empty Cars, incl. Caboose				7	7	4	4	4	2	2	2	2	2	40	1	28	28	3	3	3	3	10	1	1	1	1
Weight of Train, Actual, excl. of Loco. - M's				2,265	2,265	3,719	2,235	2,235	2,189	2,189	2,189	2,189	2,189	4,419	3,806	1,997	1,997	2,062	2,062	2,062	2,062	2,017	1,967	1,967	1,967	1,967
Weight of Train, Actual, excl. of Loco. - Tons				1,133	1,133	1,860	1,118	1,118	1,095	1,095	1,095	1,095	1,095	2,210	1,903	999	999	1,031	1,031	1,031	1,031	1,009	984	984	984	984
Average Weight per Car - Tons				39.1	39.1	53.1	48.6	48.6	42.1	42.1	42.1	42.1	42.1	34.5	65.6	29.4	29.4	54.3	54.3	54.3	54.3	45.9	46.9	46.9	46.9	46.9
Weight of Train, Adjusted Tons, adjusted to 80M CARS				1,134.2	1,133.8	1,948.9	1,090.2	1,075.3	1,083.8	1,091.3	1,091.7	1,091.7	1,091.5	2,312.7	1,688.5	1,047.1	1,031.5	976.5	1,001.0	1,007.9	1,007.1	998.6	943.4	971.1	967.9	973.6
Gross Ton Miles				3391	7,845	32,644	7,501	11,301	11,391	2,674	4,596	5,251	3,995	15,518	19,468	7,707	6,478	14,361	8,178	4,838	4,210	7,480	7,783	6,215	6,533	6,942
Oil Fired, Dry - Gals. <small>CORRECTED TO 60°F AND FOR BOILER BLOWOFF</small>	306.8	199.6	297.4	119.4	237.0	354.9	143.5	213.6	158.7	101.5	135.3	215.9	136.3	156.5	186.0	171.8	233.8	152.1	205.5	153.3	137.8	242.8	108.4	154.0	146.4	216.8
Heat Value of Oil, Dry - BTU's/Lb.	17,982	17,982	17,982	18,010	18,010	18,021	18,021	18,021	18,021	18,021	18,021	18,021	18,021	18,021	18,010	18,010	18,010	18,004	18,004	18,004	18,004	18,039	18,057	18,057	18,057	18,057
Weight of Oil, Dry - Lbs./Gal.	8.464	8.454	8.454	8.466	8.466	8.455	8.455	8.455	8.455	8.455	8.455	8.455	8.455	8.455	8.432	8.432	8.432	8.412	8.412	8.412	8.412	8.436	8.444	8.444	8.444	8.444
Oil Fired per 1000 DBHP Hr. - Gals.	213.5	220.8	217.5	270.8	254.9	211.1	219.4	233.7	196.7	272.7	242.6	294.6	259.0	235.2	206.5	227.6	290.0	186.9	219.3	229.5	234.5	256.9	218.5	226.3	2100	232.5
Oil Fired per DBHP Hr. - Lbs.	1,8049	1,8666	1,8387	2,2926	2,1580	1,7849	1,8550	1,9759	1,6631	2,3057	2,0512	2,4908	2,1898	1,9886	1,7412	1,9191	2,4453	1,5722	1,8448	1,9306	1,9726	2,1672	1,8450	1,9109	1,7732	1,9632
Oil Fired per DBHP Hr., Corrected to 18300 BTU's/Lb. - Lbs.	1,7735	1,8341	1,8067	2,2564	2,1239	1,7578	1,8248	1,9459	1,6378	2,2707	2,0100	2,4529	2,1565	1,9584	1,7137	1,8888	2,4067	1,5467	1,8149	1,8993	1,9406	2,1364	1,8205	1,8872	1,7512	1,9389
Oil Fired per Hr. per Cu. Ft. FB Volume - Lbs.	10,534	10,280	9,189	7,391	9,169	10,975	11,085	9,427	9,816	6,274	8,362	6,679	8,421	9,673	9,553	8,828	9,014	8,363	9,026	9,430	8,471	10,705	8,368	9,508	9,044	9,567
Oil Fired per Hr. - Gals.	682	665	595	478	593	710	717	610	635	406	541	432	545	626	620	573	585	609	587	613	551	694	542	616	586	620
Oil Fired per Mile - Gals.	22.8	24.3	29.0	39.9	34.3	21.2	20.9	20.3	15.1	41.4	32.1	44.9	37.2	23.3	16.1	23.3	37.2	14.3	25.2	31.9	33.0	32.4	13.1	24.1	21.7	30.4
Oil Fired per 1000 GTM - Gals.				35.2	30.2	10.9	19.1	18.9	13.9	38.0	29.4	41.1	34.1	10.1	9.6	22.3	36.1	14.7	25.1	31.7	32.7	32.5	13.9	24.8	22.4	31.2
Water from Tender - Gals. <small>CORRECTED FOR BOILER BLOW-OFF AND BOILER LEVEL DIFFERENCE</small>	3,463	2,259	3,441	1,201	2,683	3,630	1,512	2,350	1,691	1,226	1,483	2,423	1,350	1,445	2,007	1,977		1,709	2,235	1,692	1,359	2,594	1,236	1,885	1,679	2,576
Water from Tender per Hour - Gals.	7,673	7,580	6,882	4,804	6,708	7,260	7,560	6,714	6,764	4,904	5,932	4,846	5,400	5,780	6,690	6,590		6,836	6,386	6,768	5,436	7,411	6,180	7,540	6,716	7,360
Water from Tender per Mile - Gals.	257	274	335	402	388	217	220	224	161	500	352	504	369	215	174	269		161	274	353	325	346	150	295	249	361
Water from Tender per 1000 GTM - Gals.				354	342	111	202	208	148	458	323	461	338	93	103	257		165	273	350	323	347	159	303	257	371
Water to Boiler - Gals.	4,168	2,521	3,748	1,282	3,071	4,454	1,650	2,782	1,897	1,104	1,988	2,624	1,918	1,888	2,259	2,271	3,775	1,825	2,539	1,916	1,839	3,038	1,039	2,143	1,916	3,030
Steam to Cylinders - Lbs./Hr.	72,938	71,660	65,048	44,880	63,188	69,282	72,080	63,720	67,556	44,700	55,832	43,900	50,232	54,440	63,263	62,293	85,700	65,148	60,329	63,888	50,940	70,523	58,620	71,572	63,664	69,674
Steam per DBHP Hr. - Lbs.	22.8	23.8	23.8	25.4	27.3	20.7	22.0	24.4	20.9	30.0	25.0	30.0	23.9	20.5	21.1	24.8	42.5	20.0	22.5	23.9	21.7	26.1	23.6	26.3	22.8	26.1
Steam per DBHP Hr., from and at 212°F. - Lbs.	27.0	27.9	28.1	29.8	31.9	24.5	26.0	28.6	24.8	35.8	29.5	35.6	28.1	24.1	24.8	29.2	49.6	23.5	26.5	28.2	25.6	30.3	27.7	30.9	26.9	30.6
Boiler Efficiency, less FWH - %	81.9	80.3	82.1	69.9	80.0	74.2	75.2	78.7	79.3	81.1	80.4	77.4	72.6	67.1	75.4	82.5		79.9	77.5	78.9	72.2	75.8	77.4	86.9	81.9	84.6
Boiler Efficiency, incl. FWH - %	93.2	90.8	92.3	77.6	90.6	84.8	84.9	89.5	88.8	87.6	91.9	83.5	82.6	76.4	85.0	93.1		89.9	87.4	88.9	82.3	86.2	85.0	98.1	92.5	95.9
Boiler Pressure - Lbs./Sq. In.	243	247	249	242	246	238	241	236	242	238	242	237	241	238	235	242	235	242	241	241	239	241	232	236	240	239
Steam Chest Pressure - Lbs./Sq. In.	222	219	226	230	227	218	220	217	222	227	227	227	226	223	211	222	218	222	239	235	240	231	222	226	230	236
Back Pressure - Lbs./Sq. In.	10.3	10.7	8.5	4.2	9.7	10.8	11.3	10.0	9.9	5.2	9.0	4.8	6.6	10.2	6.8	5.9	5.4	8.2	7.8	8.5	7.2	9.5	6.0	7.3	7.2	8.1
Pressure Exhaust Steam to Nozzle - Lbs./Sq. In.	7.5	7.9	7.2	2.3	5.1	8.4	8.9	7.6	8.1	4.4	7.4	4.4	5.6	8.2	5.4	3.8	4.1	7.1	6.5	7.6	6.4	6.7	4.7	6.4	6.6	5.8
Pressure Exhaust Steam to FWH - Lbs./Sq. In.	7.6	7.3	6.8	3.5	8.2	9.1	9.5	8.1	8.5	4.2	6.3	2.5	4.2	7.8	6.4	4.6	4.0	6.6	5.7	7.2	5.7	7.2	4.4	4.8	5.3	5.7
Temperature Steam to Steam Chest - °F.	644	614	632	598	618	646	638	618	646	590	626	560	596	614	620	618	586	626	620	627	605	600	606	614	629	617
Temperature Exhaust Steam to Nozzle - °F.	322	291	330	298	325	326		316	299	309	318	258	283	283	268	260	250	278	291	311	294	270	237	275	297	290
Temperature Exhaust Steam to FWH - °F.	334	309	357	329	360	332	313	356	302	346	349	317	334	299	279	279	305	283	326	354	343	313	252	297	322	331
Temperature Water from Tender - °F.	78	77	79	83	83	78	76	77	82	83	84	84	80	81	76	77		79	80	80	76	76	76	77	77	78
Temperature Water from FWH - °F.	224	223	221	209	226	228	227	223	225	187	220	172	208	216	221	217	211	225	220	220	213	222	216	219	220	220
Temperature Flue Gas in Smokebox - °F.	566	471	435			575	564	545	562	519	545	489	524	531	497	552	511	548	544	552	528	514				
Draft Back of Smokebox - Ins. Water	6.5	17.2	13.0	9.6	17.1	19.7	21.8	20.6	20.7	9.5	17.0	9.8	13.6	10.1	14.9	13.8	11.8	19.0	15.9	16.3	13.7	18.3	17.4	14.8	15.5	12.8
Firebox Draft - Ins. Water		13.2	12.0	7.7	12.1	13.8	15.3	15.4	14.8	6.7	12.4	7.3	9.8	13.0	10.3	9.3	8.4	14.6	11.4	10.9	9.2	13.3	14.1	10.9	11.0	13.1
Carbon Dioxide (CO <sub>2</sub> ) in Flue Gas - %								14.0	14.9	14.5				13.7		13.5	14.4					14.0				
Excess Air - %								15.0	8.5	11.5				17.5		19.0	12.0					15.0				

SUMMARY DATA SHEET—RUNS 9-15

Run and Area No.	9E1	9E2	9E3	9E4	10W1	10W2	10W3	10W4	10W5	10W6	11E1	11E2	11E3	11E4	11E5	12W1	12W2	13E1	14W1	14W2	14W3	14W5	14W6	14W7	15E1	15E2
Length of Run - Miles	4.96	8.24	6.88	5.91	12.65	8.07	6.24	4.01	11.20	4.61	5.98	6.50	7.59	5.83	5.95	6.33	5.40	7.69	9.84	5.66	4.34	6.43	10.13	4.47	4.34	5.83
Running Time - Hrs.	0.25	0.15	0.35	0.30	0.36	0.20	0.40	0.35	0.80	0.20	0.15	0.15	0.25	0.25	0.25	0.15	0.20	0.25	0.20	0.15	0.25	0.40	0.25	0.20	0.25	0.20
Average Speed - MPH	17.84	54.93	19.66	19.70	36.14	40.35	15.60	11.46	14.00	23.00	39.87	43.33	30.36	23.32	23.80	42.20	27.00	30.76	49.20	37.73	17.36	16.08	40.52	22.35	17.36	29.15
Average Developed Adjusted DB Horsepower	2347	3111	2543	2525	3493	3599	2272	1753	2084	2754	3574	3246	3330	3024	3052	3050	2867	2929	3471	3042	2307	2242	2019	2681	2085	2662
Average Cutoff - %	63.6	35.5	64.5	60.1	56.1	52.8	72.3	73.3	73.3	67.2	49.7	48.3	57.2	66.3	65.4	49.5	58.2	53.9	45.7	50.4	70.3	66.6	33.0	68.2	73.3	57.4
No. Loaded Cars, incl. Test Cars	30	30	18	18	19	19	19	19	19	22	24	24	13	13	13	2	2	33	17	17	17	17	20	20	28	28
No. Empty Cars, incl. Caboose	4	4	2	2	4	4	4	4	4	22	3	3	5	5	5	40	40	1	1	1	1	1	36	36	8	8
Weight of Train, Actual, excl. of Loco. - M's	3558	3558	2038	2038	2189	2189	2189	2189	2189	4324	3476	3476	2015	2015	2015	2197	2197	3612	2021	2021	2021	2021	4340	4340	3716	3716
Weight of Train, Actual, excl. of Loco. - Tons	1779	1779	1019	1019	1095	1095	1095	1095	1095	2162	1738	1738	1008	1008	1008	1099	1099	1806	1011	1011	1011	1011	2170	2170	1858	1858
Average Weight per Car - Tons	52.3	52.3	51.0	51.0	47.6	47.6	47.6	47.6	47.6	70.0	69.4	69.4	56.0	56.0	56.0	54.2	54.2	53.1	56.1	56.1	56.1	56.1	38.8	38.8	51.6	51.6
Weight of Train, Adjusted Tons ADJUSTED TO 80 MCARS	1712.8	1616.0	997.1	997.7	1065.6	1064.8	1081.7	1081.2	1080.7	2162.0	1586.7	1524.7	981.4	991.6	979.7	1231.0	1175.0	1726.5	973.6	957.9	986.5	987.3	2205.9	2181.8	1785.4	1789.8
Gross Ton Miles	7670	13316	6860	5896	13480	8593	6750	4336	12104	9967	9488	9911	7449	5781	5829	7800	16945	13277	9088	5422	4281	6348	22346	9753	7749	10935
Oil Fired, Dry - Gals. <small>CORRECTED TO 60°F AND FOR BOILER BLOWOFF</small>	130.5	84.9	191.4	160.4	235.3	134.2	202.6	154.2	385.6	127.6	99.6	95.3	162.0	149.8	157.2	88.3	110.4	148.5	132.5	87.4	134.7	224.2	115.1	136.5	131.0	115.0
Heat Value of Oil, Dry - BTU's/Lb.	18009	18009	18009	18009	18057	18057	18057	18057	18057	18057	18046	18046	18046	18046	18046	18033	18033	18057	18045	18045	18045	18045	18045	18045	18099	18099
Weight of Oil, Dry - Lbs./Gal.	8439	8439	8439	8439	8444	8444	8444	8444	8444	8444	8456	8456	8456	8456	8456	8442	8442	8426	8403	8403	8403	8403	8403	8403	8394	8394
Oil Fired per 1000 DBHP Hr. - Gals.	2225	1818	2450	2117	1924	1864	2307	2513	2313	2429	1858	1957	1945	1981	2060	1930	2064	2027	1909	1916	2335	2321	2280	2546	2513	2161
Oil Fired per DBHP Hr. - Lbs.	18777	15342	18144	17865	16246	15740	19480	21220	19531	21102	15711	16548	16447	16751	17419	16293	17424	17080	16041	16100	19621	21016	19159	21394	21094	18139
Oil Fired per DBHP Hr., Corrected to 18300 BTU's/Lb. - Lbs.	18478	15098	17856	17581	16030	15531	19221	20938	19271	20821	15493	16318	16218	16518	17177	16055	17170	16052	15818	15876	19348	20724	18893	21027	20862	17939
Oil Fired per Hr. per Cu. Ft. FB Volume - Lbs.	8.056	8.182	8.444	8.258	10.369	10.361	8.089	6.806	7.429	9.846	10.266	9.817	10.020	9.269	9.724	9.092	9.134	9.151	10.184	9.958	8.277	8.621	7.067	10.495	8.041	8.822
Oil Fired per Hr. - Gals.	52.2	53.0	54.7	53.5	67.2	67.1	52.4	44.1	48.2	63.8	66.4	63.5	64.8	59.9	62.9	58.9	59.2	59.4	66.3	58.3	53.9	56.1	46.0	68.3	52.4	57.5
Oil Fired per Mile - Gals.	29.3	10.3	27.8	27.1	18.6	16.6	33.6	38.5	34.4	27.7	16.7	14.7	21.3	25.7	26.4	13.9	21.9	19.3	13.5	15.4	31.0	34.9	11.4	30.5	30.2	19.7
Oil Fired per 1000 GTM - Gals.	17.0	6.4	27.9	27.2	10.8	15.6	31.0	35.6	31.8	12.8	10.5	9.6	21.7	25.9	27.0	11.3	18.6	11.2	14.6	16.1	31.5	35.3	5.1	14.0	16.9	11.0
Water from Tender - Gals. <small>CORRECTED FOR BOILER BLOW-OFF AND BOILER LEVEL DIFF.</small>	1440	982	2186	1929	2669	1543	2597	1682	4332	1327	920	1215	1728	1661	1730	1041	1473	1636	1493	873	2478			1524	1543	1319
Water from Tender per Hour - Gals.	5760	6547	6246	6430	7626	7715	6483	4806	5415	6635	6133	8100	6912	6644	6920	6940	7365	6544	7465	5820			6195	7620	6172	6595
Water from Tender per Mile - Gals.	323	119	318	326	211	191	416	419	387	288	154	187	228	285	291	164	273	213	152	154			385	341	356	226
Water from Tender per 1000 GTM - Gals.	188	74	319	327	198	180	385	388	358	133	97	123	232	287	297	134	232	123	164	161			390	156	199	126
Water to Boiler - Gals.	1625	1116	2462	2288	2633	1719	2745	1957	4956	1601	1407	1143	2100	1790	2399	1224	1386	1820	1894	1039	1701	2766	1731	2142	1757	1314
Steam to Cylinders - Lbs./Hr.	54240	62347	58929	60683	51880	68800	52468	47589	51143	63445	58407	77627	66196	63304	65604	66140	70260	62244	65675	55533	45212	58958	40204	72265	58196	62605
Steam per DBHP Hr. - Lbs.	23.1	20.0	23.2	24.0	14.9	19.1	23.1	27.1	24.5	23.0	16.3	23.9	19.8	20.9	21.5	21.7	24.5	21.2	18.9	18.3	19.6	26.3	19.9	27.0	27.9	23.5
Steam per DBHP Hr., from and at 212°F. - Lbs.	26.8	23.5	27.2	28.2	17.4	22.5	27.1	31.7	28.7	26.6	19.3	27.6	23.1	24.5	25.4	25.6	28.8	25.0	22.3	21.6	23.1	30.9	23.2	31.3	32.8	27.6
Boiler Efficiency, less FWH - %	72.6	82.8	80.5			72.6	76.0	80.3	79.5	73.6	68.8		76.7	77.1	80.8	85.0	86.5	78.9	75.4	70.7		78.7		82.6	83.7	80.3
Boiler Efficiency, incl. FWH - %	87.6	93.7	90.8			88.7	86.6	90.2	89.8	89.3	80.3		87.8	87.1	93.1	96.5	96.3	89.2	86.9	80.5		89.1		95.6	94.3	89.8
Boiler Pressure - Lbs./Sq. In.	235	240	241	241	242	241	242	241	241	241	242	237	239	237	238	242	242	240	238	242	243	242	242	237	220	220
Steam Chest Pressure - Lbs./Sq. In.	225	230	231	231	232	231	232	231	231	231	235	232	235	233	233	228	223	224	224	222	227	229	233	217	203	203
Back Pressure - Lbs./Sq. In.	5.4	5.7	7.1	6.1	11.0	10.0	7.5	5.1	6.6	9.3	8.4	9.2	9.5	8.9	8.9	6.2	7.3	7.4	7.6	8.1	6.3	7.3	3.4	8.3	6.2	7.8
Pressure Exhaust Steam to Nozzle - Lbs./Sq. In.	3.9	5.3	5.9	6.0	6.8	5.3	6.3	4.8	5.9	6.2	7.3	8.0	7.6	7.7	7.5	5.3	6.3	5.6	6.1	6.6	5.2	5.9	3.1	5.3	5.2	6.4
Pressure Exhaust Steam to FWH - Lbs./Sq. In.	3.7	4.0	5.1	4.6	8.7	7.8	5.2	3.2	4.6	7.1	7.0	7.6	6.9	7.3	7.3	4.6	5.8	4.7	5.3	3.8	4.2	6.3	1.7	4.8	4.1	6.1
Temperature Steam to Steam Chest - °F.	582	622	611	614	631	644	608	595	607	598	639	598	619	621	629	627	630	634	638	642	625	621	588	612	608	618
Temperature Exhaust Steam to Nozzle - °F.	258	263	273	285	300	302	288	278	287	264	281	267	274	298	308	258	286	283	291	288	293	293	227	269	289	301
Temperature Exhaust Steam to FWH - °F.	304	274	315	321	312	305	337	330	335	290	283	286	288	341	334	269	308	298	289	295	329	339	247	311	331	328
Temperature Water from Tender - °F.	78	76	77	76	78	78	75	76	75	77	76	75	76	77	78	78	80	76	75	76	72	74	75	76	76	76
Temperature Water from FWH - °F.	214	221	218	218	232	231	218	213	216	227	225	227	227	226	221	223	226	224	228	226	221	221	214	233	215	221
Temperature Flue Gas in Smokebox - °F.	504	473	525	535	544	532	528	516	525	512	551	519	522	550	553	542	553	553	552	557	540	547	503	455	528	523
Draft Back of Smokebox - Ins. Water	10.6	11.2	13.2	11.9	20.8	19.5	13.0	10.0	12.2	15.8	17.8	19.5	18.9	22.1	16.9	16.2	19.4	17.9	18.6	19.8	15.7	16.4	9.7	16.9	15.4	18.0
Firebox Draft - Ins. Water	8.7	9.7	10.5	9.9	15.2	13.8	9.6	7.5	9.1	12.3	13.3	15.3	14.2	16.7	12.5	13.2	15.4	13.9	14.5	14.8	12.1	12.0	6.9	12.3	10.8	12.9
Carbon Dioxide (CO <sub>2</sub> ) in Flue Gas - %			13.0	14.2	13.6	13.3	12.5	13.2	12.8	13.2			15.0	14.1	14.3	13.2	11.5									
Excess Air - %			23.0	13.0	18.0	21.0	28.0	22.0	25.0	22.0			7.5	14.0	13.0	22.0	39.0									



# SUMMARY DATA SHEET — RUNS 15-20

Run and Area No.	15E3	15E4	16W1	17E1	17E2	17E3	17E4	17E5	18W1	18W2	19E1	19E2	19E3	19E4	20W1	20W2	20W3	20W4
Length of Run - Miles	7.25	3.57	6.27	10.80	6.34	8.65	6.87	7.41	10.51	3.52	6.89	5.83	6.00	5.96	8.14	3.83	2.87	4.96
Running Time - Hrs.	0.25	0.20	0.45	0.25	0.25	0.20	0.35	0.35	0.25	0.25	0.15	0.20	0.25	0.25	0.20	0.30	0.10	0.25
Average Speed - MPH	29.00	17.85	13.93	43.20	25.36	43.26	19.60	21.17	42.04	14.08	45.93	29.15	24.00	23.84	40.70	12.77	14.10	19.84
Average Developed Adjusted DB Horsepower	2,948	2,317	1,917	3,007	3,224	3,077	2,560	2,716	3,224	1,919	2,748	3,102	2,884	2,843	2,906	2,848	2,052	2,392
Average Cutoff - %	59.4	73.3	71.9	47.2	61.3	47.9	71.0	67.6	51.0	70.5	43.6	60.4	67.3	63.6	49.0	70.4	73.3	67.2
No. Loaded Cars, incl. Test Cars	14	14	9	28	28	28	18	18	23	23	26	13	13	13	2	2	12	10
No. Empty Cars, incl. Caboose	8	8	25	12	12	12	3	3	1	1	14	10	10	10	39	39	39	69
Weight of Train, Actual, excl. of Loco. - M's	2,050	2,050	2,167	3,698	3,698	3,698	2,351	2,351	2,150	2,150	3,757	1,959	1,959	1,959	2,087	2,087	2,087	4,318
Weight of Train, Actual, excl. of Loco. - Tons	1,025	1,025	1,084	1,849	1,849	1,849	1,176	1,176	1,075	1,075	1,879	980	980	980	1,044	1,044	1,044	2,159
Average Weight per Car - Tons	46.6	46.6	31.9	46.2	46.2	46.2	56.0	56.0	44.8	44.8	47.0	42.6	42.6	42.6	25.5	25.5	25.5	27.3
Weight of Train, Adjusted Tons ADJUSTED TO 80 M CARS	1,009.2	1,016.9	1,109.3	1,774.5	1,828.6	1,768.2	1,143.3	1,144.5	1,052.1	1,065.9	1,772.7	973.6	974.8	974.9	1,228.8	1,084.1	1,093.4	2,467.6
Gross Ton Miles	7,317	3,630	6,955	19,165	11,593	15,295	7,843	8,481	11,058	3,752	12,248	5,676	5,849	5,810	10,002	4,152	3,083	12,239
Oil Fired, Dry - Gals. <small>CORRECTED TO 60°F AND FOR BOILER BLOWOFF</small>	163.4	94.8	223.8	151.5	153.5	126.2	213.0	209.7	153.8	127.0	83.9	141.3	164.7	154.4	121.5	134.4	98.1	139.4
Heat Value of Oil, Dry - BTU's/Lb.	18,099	18,099	18,135	18,046	18,046	18,046	18,046	18,046	18,046	18,046	18,070	18,070	18,070	18,070	18,020	18,020	18,020	18,020
Weight of Oil, Dry - Lbs./Gal.	8,394	8,394	8,393	8,456	8,456	8,456	8,456	8,456	8,456	8,456	8,459	8,459	8,459	8,459	8,463	8,463	8,463	8,463
Oil Fired per 1000 DBHP Hr. - Gals.	221.7	209.6	258.1	201.5	191.4	205.2	237.8	219.8	190.8	164.8	203.6	227.8	228.4	217.2	209.0	242.4	239.0	233.1
Oil Fired per DBHP Hr. - Lbs.	1,860.9	1,717.4	2,166.2	1,703.9	1,626.9	1,735.2	2,010.8	1,858.6	1,613.4	2,239.1	1,722.3	1,927.0	1,932.0	1,837.3	1,768.8	2,051.4	2,022.7	1,972.7
Oil Fired per DBHP Hr., Corrected to 18300 BTU's/Lb. - Lbs.	1,840.4	1,698.5	2,146.7	1,680.2	1,604.3	1,711.1	1,982.8	1,832.8	1,591.0	2,208.0	1,700.6	1,902.7	1,907.7	1,814.2	1,741.7	2,020.0	1,991.8	1,942.5
Oil Fired per Hr. per Cu. Ft. FB Volume - Lbs.	10.039	7.269	7.629	9.369	9.614	9.750	9.412	9.259	9.505	7.856	8.662	10.929	10.103	9.559	9.394	6.931	7.583	8.632
Oil Fired per Hr. - Gals.	6.54	4.74	4.97	6.06	6.22	6.31	6.09	5.99	6.15	5.08	5.60	7.07	6.59	6.18	6.07	4.98	4.90	5.58
Oil Fired per Mile - Gals.	22.5	26.6	35.7	14.0	24.5	14.6	31.1	28.3	14.6	36.1	12.2	24.2	27.4	25.9	14.9	35.1	34.8	20.1
Oil Fired per 1000 GTM - Gals.	22.3	26.1	32.2	7.9	13.4	8.3	22.2	24.7	13.9	33.9	6.8	24.9	28.2	26.6	21.4	32.4	31.8	11.4
Water from Tender - Gals. <small>CORRECTED FOR BOILER BLOWOFF AND BOILER LEVEL DIFFERENCE</small>	1,890	1,247	2,634	1,471	1,471	1,274	2,024				947	1,252	1,773	1,702	1,470	1,583	1,104	1,568
Water from Tender per Hour - Gals.	7,560	6,235	5,853	5,884	5,884	6,370	5,783				6,764	6,260	7,092	6,808	7,350	5,277	5,220	6,272
Water from Tender per Mile - Gals.	261	349	420	136	232	147	295				137	215	296	286	181	413	391	316
Water from Tender per 1000 GTM - Gals.	258	344	379	77	127	83	258				77	221	303	293	147	381	358	128
Water to Boiler - Gals.	1,971	1,520	2,707	2,004	2,074	1,719	3,087	2,825	2,140	1,961	1,108	2,062	2,105	2,016	1,684	1,844	1,252	1,914
Steam to Cylinders - Lbs./Hr.	72,044	58,980	54,920	56,312	56,072	60,935	54,849	71,983	48,052	63,836	60,360	59,760	67,524	64,584	69,740	49,343	51,745	59,548
Steam per DBHP Hr. - Lbs.	24.4	25.5	28.5	18.7	17.3	19.8	21.4	26.4	14.9	33.3	22.0	19.3	23.4	22.7	24.0	26.7	25.2	24.9
Steam per DBHP Hr., from and at 212°F. - Lbs.	28.7	22.8	33.6	22.0	20.6	23.4	25.2	31.3	17.6	38.1	25.5	22.7	27.6	26.8	28.2	31.4	29.5	29.1
Boiler Efficiency, less FWH - %	82.0		82.7	71.0	70.3	73.7	70.1				79.6		77.4	79.2		83.1	78.9	80.4
Boiler Efficiency, incl. FWH - %	92.3		92.2	82.2	81.5	85.1	81.8				90.6		88.3	90.1		93.2	88.5	91.5
Boiler Pressure - Lbs./Sq. In.	234	218	236	241	242	243	243	243	240	235	234	237	239	239	235	240	241	235
Steam Chest Pressure - Lbs./Sq. In.	215	201	228	220	219	222	221	220	223	228	219	217	218	221	219	227	235	221
Back Pressure - Lbs./Sq. In.	9.4	7.1	6.0	7.3	7.6	7.5	8.3	9.1	8.6	6.8	6.1	9.3	10.1	9.6	7.1	4.8	6.4	7.2
Pressure Exhaust Steam to Nozzle - Lbs./Sq. In.	5.7	5.9	5.2	6.6	7.5	7.1	6.6	7.5	7.0	4.9	4.6	7.5	8.4	7.9	5.9	4.2	5.4	4.9
Pressure Exhaust Steam to FWH - Lbs./Sq. In.	6.9	4.5	4.1	5.7	6.0	5.8	4.9	6.0	5.8	4.0	4.2	5.5	6.7	6.6	4.5	2.7	3.7	4.0
Temperature Steam to Steam Chest - °F.	624	597	598	634	648	640	626	638	644	552	586	632	636	635	620	593	594	596
Temperature Exhaust Steam to Nozzle - °F.	286	266	267	272	317	284	285	316	291	235	234	291	313	312	261	252	269	252
Temperature Exhaust Steam to FWH - °F.	296	323	323	281	336	287	332	354	291	274	251	303	337	345	269	309	326	288
Temperature Water from Tender - °F.	72	72	72	74	74	75	76	77	76	77	75	75	76	76	76	77	78	74
Temperature Water from FWH - °F.	222	217	206	225	224	225	221	223	226	215	222	227	227	224	223	207	211	217
Temperature Flue Gas in Smokebox - °F.	527	512	519	555	569	553	522	554	558	490	504	542	553	551	529	508	514	514
Draft Back of Smokebox - Ins. Water	20.5	15.9	12.9	16.5	16.6	17.4	17.8	18.8	18.8	13.8	15.0	21.3	21.7	19.4	16.3	10.8	13.3	14.6
Firebox Draft - Ins. Water	14.0	10.6	8.8	10.8	10.6	10.8	11.5	12.1	12.4	9.3	9.0	14.6	14.5	12.5	11.0	7.3	8.8	9.1
Carbon Dioxide (CO <sub>2</sub> ) in Flue Gas - %	13.5	13.6	13.1				13.1	12.4	12.3	12.6		10.3	11.1	11.5	12.9	13.0	13.0	13.0
Excess Air - %	19.0	18.0	22.5				22.5	29.0	30.0	27.0		55.0	44.0	39.0	24.0	23.5	23.5	23.5



# SUMMARY DATA SHEET—RUNS 21-22

Run and Area No.	21E1	21E2	21E3	21E4	21E5	21E6	21E7	21E8	21E9	22W1	22W2	22W3	22W4	22W5
Length of Run - Miles	4.03	11.50	6.55	8.24	19.96	6.99	4.91	5.23	5.95	5.49	5.72	5.34	5.25	4.34
Running Time - Hrs.	0.20	0.30	0.15	0.35	0.55	0.15	0.20	0.25	0.20	0.15	0.30	0.33	0.37	0.20
Average Speed - MPH	20.15	38.33	43.67	23.54	27.20	46.60	24.55	20.92	29.75	36.60	19.07	16.18	14.19	21.70
Average Developed Adjusted DB Horsepower	2,003	2,779	2,892	2,706	2,796	2,807	2,342	2,597	2,995	3,021	2,428	2,164	2,018	2,713
Average Cutoff - %	58.8	47.1	44.6	62.3	59.1	44.8	51.9	66.5	70.3	48.3	71.0	70.9	72.9	67.9
No. Loaded Cars, incl. Test Cars	17	17	17	17	17	17	17	3	3	20	20	20	20	30
No. Empty Cars, incl. Caboose	31	31	31	31	31	31	31	28	28	1	1	1	1	23
Weight of Train, Actual, excl. of Loco. - M's	3,730	3,730	3,730	3,730	3,780	3,790	3,730	1,949	1,949	2,231	2,231	2,231	2,231	4,732
Weight of Train, Actual, excl. of Loco. - Tons	1,865	1,865	1,865	1,865	1,865	1,865	1,865	975	975	1,116	1,116	1,116	1,116	2,366
Average Weight per Car - Tons	38.9	38.9	38.9	38.9	38.9	38.9	38.9	31.5	31.5	53.1	53.1	53.1	53.1	44.6
Weight of Train, Adjusted Tons CORRECTED TO 80 MCARS	1,871.7	1,875.9	1,877.7	1,871.1	1,873.9	1,882.9	1,871.9	1,002.3	1,009.6	1,067.0	1,090.2	1,001.3	1,092.8	2,265.5
Gross Ton Miles	7,543.0	21,572.9	12,298.9	15,417.9	28,033.5	13,161.5	9,191.0	5,242.0	6,007.1	5,857.8	6,235.9	5,346.9	5,737.2	9,605.7
Oil Fired, Dry - Gals. <small>CORRECTED TO 60°F AND FOR BOILER BLOWOFF</small>	91.0	179.8	93.4	196.7	320.4	87.7	86.7	152.1	134.3	90.7	162.1	167.4	180.8	133.1
Heat Value of Oil, Dry - BTU's/Lb.	18,046	18,046	18,046	18,046	18,046	18,046	18,046	18,046	18,046	18,033	18,033	18,033	18,033	18,033
Weight of Oil, Dry - Lbs./Gal.	8.956	8.956	8.956	8.956	8.956	8.956	8.956	8.956	8.956	8.942	8.942	8.942	8.942	8.942
Oil Fired per 1000 DBHP Hr. - Gals.	227.3	215.6	215.4	207.6	208.4	208.4	185.1	234.3	224.2	200.0	222.5	234.4	242.2	245.2
Oil Fired per DBHP Hr. - Lbs.	1,922.0	1,823.1	1,821.4	1,755.5	1,762.2	1,762.2	1,565.2	1,981.2	1,895.8	1,688.4	1,878.3	1,978.8	2,049.7	2,070.0
Oil Fired per DBHP Hr., Corrected to 18300 BTU's/Lb. - Lbs.	1,895.3	1,797.8	1,796.1	1,731.1	1,737.7	1,737.7	1,543.4	1,953.7	1,865.8	1,663.7	1,850.9	1,949.2	2,014.8	2,039.8
Oil Fired per Hr. per Cu. Ft. FB Volume - Lbs.	7.035	9.259	9.631	8.684	9.014	9.039	6.706	9.395	10.376	9.320	8.332	7.826	7.547	10.265
Oil Fired per Hr. - Gals.	455	599	623	562	583	585	434	608	671	604	540	507	489	665
Oil Fired per Mile - Gals.	22.6	15.6	14.3	23.8	21.4	12.6	17.7	29.1	22.6	16.5	28.3	31.3	34.4	30.7
Oil Fired per 1000 GTM - Gals.	12.1	8.3	7.6	12.8	11.4	6.7	9.4	29.0	22.4	15.5	26.0	31.3	31.5	13.8
Water from Tender - Gals. <small>CORRECTED FOR BOILER BLOW-OFF AND BOILER LEVEL DIFFERENCE</small>	1,019	1,872	1,025	2,200	3,451	958	1,070	1,716	1,542	1,081	1,586	1,930	2,115	
Water from Tender per Hour - Gals.	5,095	6,240	6,833	6,286	6,275	6,387	5,350	6,864	7,710	7,207	5,287	5,848	5,716	
Water from Tender per Mile - Gals.	253	163	156	267	231	137	218	328	269	197	277	361	403	
Water from Tender per 1000 GTM - Gals.	135	87	83	143	123	73	116	327	257	185	254	361	369	
Water to Boiler - Gals.	1,184	2,412	1,903	2,537	4,049	1,196	949	2,094	1,896	1,316	1,948	2,140	2,259	1,689
Steam to Cylinders - Lbs./Hr.	48,385	59,403	69,773	59,726	59,793	60,947	50,400	65,376	73,665	68,967	50,337	55,445	54,284	82,945
Steam per DBHP Hr. - Lbs.	24.2	21.4	22.4	22.1	21.4	21.7	21.5	25.2	24.6	22.8	20.7	26.6	26.9	30.6
Steam per DBHP Hr., from and at 212°F. - Lbs.	28.3	25.1	26.4	26.1	25.3	25.2	25.3	29.5	29.1	27.0	24.2	30.2	31.6	35.8
Boiler Efficiency, less FWH - %	79.5	75.8	81.3	80.3	77.7	77.6	84.1	81.1	83.6		70.0	82.2		
Boiler Efficiency, incl. FWH - %	90.0	86.8	93.3	91.0	88.3	88.5	92.5	92.7	95.9		80.2	92.7		
Boiler Pressure - Lbs./Sq. In.	234	234	233	238	237	235	236	238	238	242	240	242	242	241
Steam Chest Pressure - Lbs./Sq. In.	222 → 222	215	215	221	220	220	228	221	218	225	226	229	229	222
Back Pressure - Lbs./Sq. In.	6.7	8.3	8.4	8.6	9.0	8.2	5.7	9.1	12.1	8.0	8.9	7.8	7.6	9.7
Pressure Exhaust Steam to Nozzle - Lbs./Sq. In.	5.8	7.5	7.4	7.9	8.2	7.0	4.4	8.1	10.3	7.5	7.8	7.0	6.9	7.8
Pressure Exhaust Steam to FWH - Lbs./Sq. In.	2.8	5.0	5.8	6.5	6.9	4.0	3.8	5.6	8.2	5.2	6.4	5.5	5.5	7.0
Temperature Steam to Steam Chest - °F.	605	620	636	640	642	600	612	617	650	645	624	632	624	612
Temperature Exhaust Steam to Nozzle - °F.	242	274	275	307	307	262	267	288	335	284	312	310	302	283
Temperature Exhaust Steam to FWH - °F.	280	277	275	337	327	280	288	326	360	285	340	349	338	317
Temperature Water from Tender - °F.	76	77	77	77	77	78	79	75	76	77	77	77	78	80
Temperature Water from FWH - °F.	219	227	227	224	226	225	214	223	229	227	227	222	224	222
Temperature Flue Gas in Smokebox - °F.	520	535	540	558	559	519	529	517	548		545	538	531	533
Draft Back of Smokebox - Ins. Water	15.5	17.3	17.0	17.1	17.7	17.5	12.8	18.6	22.6	17.2	16.5	16.6	14.1	18.5
Firebox Draft - Ins. Water	10.9	11.3	11.3	10.6	11.0	11.3	8.5	11.7	14.6	10.7	10.7	9.8	9.1	11.6
Carbon Dioxide (CO <sub>2</sub> ) in Flue Gas - %								12.3	12.3	12.5	11.8	10.9	11.0	
Excess Air - %								30.0	30.0	28.0	35.5	47.0	45.0	

# SUMMARY DATA SHEET — RUNS 23-24

Run and Area No.	23E1	23E2	23E3	23E4	23E5	23E6	23E7	23E8	23E9	24W1	24W2	24W3	24W5	24W6	24W7
Length of Run - Miles	12.94	14.92	6.08	10.00	7.59	6.23	7.82	5.21	18.96	12.69	8.80	5.80	3.08	6.02	3.95
Running Time - Hrs.	0.40	0.50	0.15	0.20	0.15	0.25	0.45	0.30	1.00	0.30	0.20	0.20	0.20	0.45	0.25
Average Speed - MPH	32.35	29.84	40.53	50.00	50.60	24.92	17.38	17.37	18.96	42.30	44.00	29.00	15.40	13.38	15.80
Average Developed Adjusted DB Horsepower	2,731	2,654	2,969	2,852	2,972	2,593	2,162	2,253	2,323	2,789	2,756	2,733	2,139	2,212	2,241
Average Cutoff - %	49.9	51.7	45.4	42.0	41.7	52.6	68.6	65.6	63.7	44.3	44.1	50.1	67.2	73.3	67.0
No. Loaded Cars, incl. Test Cars	33	33	33	33	33	20	20	20	20	12	12	12	12	12	12
No. Empty Cars, incl. Caboose	2	2	2	2	2	2	2	2	2	16	16	16	16	16	16
Weight of Train, Actual, excl. of Loco. - M's	3,690	3,690	3,690	3,690	3,690	2,195	2,195	2,195	2,195	2,221	2,221	2,221	2,221	2,221	2,221
Weight of Train, Actual, excl. of Loco. - Tons	1,845	1,845	1,845	1,845	1,845	1,098	1,098	1,098	1,098	1,111	1,111	1,111	1,111	1,111	1,111
Average Weight per Car - Tons	52.7	52.7	52.7	52.7	52.7	49.9	49.9	49.9	49.9	39.7	39.7	39.7	39.7	39.7	39.7
Weight of Train, Adjusted Tons CORRECTED TO 80 MCARS	1,741.9	1,749.7	1,719.6	1,670.1	1,678.4	1,070.4	1,075.7	1,076.8	1,075.9	1,112.9	1,113.8	1,112.3	1,112.2	1,111.8	1,111.8
Gross Ton Miles	22,540	26,106	10,955	16,701	12,739	6,669	8,412	5,620	20,399	14,110	9,801	6,451	3,426	6,693	4,392
Oil Fired, Dry - Gals. CORRECTED TO 60°F AND FOR BOILER BLOWOFF	229.0	279.5	92.1	113.8	85.3	141.0	219.1	182.5	512.5	168.7	110.0	108.8	100.2	225.3	128.3
Heat Value of Oil, Dry - BTU's/Lb.	18,076	18,076	18,076	18,076	18,076	18,076	18,076	18,076	18,076	18,027	18,027	18,027	18,027	18,027	18,027
Weight of Oil, Dry - Lbs./Gal.	8.453	8.453	8.453	8.453	8.453	8.453	8.453	8.453	8.453	8.421	8.421	8.421	8.421	8.421	8.421
Oil Fired per 1000 DBHP Hr. - Gals.	241.0	245.4	237.4	218.9	191.4	217.4	225.3	225.7	220.7	201.7	199.7	199.1	234.3	226.3	229.0
Oil Fired per DBHP Hr. - Lbs.	2,0541	2,0744	2,0067	1,8504	1,6179	1,8377	1,9045	1,9078	1,8656	1,6985	1,6817	1,6766	1,9730	1,9057	1,9284
Oil Fired per DBHP Hr., Corrected to 18300 BTU's/Lb. - Lbs.	2,0290	2,0491	1,9822	1,8278	1,5982	1,8153	1,8813	1,8845	1,8428	1,6732	1,6566	1,6516	1,9436	1,8773	1,8997
Oil Fired per Hr. per Cu. Ft. FB Volume - Lbs.	8.842	8.639	9.484	8.791	8.791	8.715	7.523	7.853	7.929	8.648	8.463	8.370	7.714	7.714	7.899
Oil Fired per Hr. - Gals.	572	559	614	569	569	564	487	508	513	562	550	544	501	501	513
Oil Fired per Mile - Gals.	17.7	18.7	15.1	11.4	11.2	22.6	28.0	29.3	27.0	13.3	12.5	18.8	32.5	37.4	32.5
Oil Fired per 1000 GTM - Gals.	10.2	10.7	8.8	6.8	6.7	21.1	26.1	27.1	25.1	12.0	11.2	16.9	29.3	33.7	29.2
Water from Tender - Gals. CORRECTED FOR BOILER BLOWOFF AND BOILER LEVEL DIFF.	2,416	3,022	1,208	1,328	966	1,561	2,524	2,006	5,577		796	1,226	1,184	2,540	1,374
Water from Tender per Hour - Gals.	6,040	6,044	8,053	6,640	6,440	6,244	5,609	6,687	5,577		3,980	6,130	5,920	5,644	5,496
Water from Tender per Mile - Gals.	187	203	199	133	127	251	323	385	294		90	211	384	422	348
Water from Tender per 1000 GTM - Gals.	107	116	116	80	76	234	300	357	273		81	190	346	380	313
Water to Boiler - Gals.	2,911	3,504	1,407	1,499	1,125	1,661	2,880	1,993	6,542	1,562	888	1,242	1,274	2,889	1,789
Steam to Cylinders - Lbs./Hr.	57,763	57,782	77,153	63,645	61,740	59,836	53,353	46,893	53,099	40,860	38,260	58,875	56,465	53,373	52,224
Steam per DBHP Hr. - Lbs.	21.1	21.8	26.0	22.3	20.8	23.1	24.7	20.8	22.9	14.7	13.9	21.5	26.4	24.3	23.3
Steam per DBHP Hr., from and at 212°F. - Lbs.	24.8	25.6	30.7	26.2	24.6	27.1	29.1	24.6	27.0	17.3	16.3	25.3	31.0	28.4	27.4
Boiler Efficiency, less FWH - %	76.2	77.5		83.5	81.5	78.8	81.6	71.6	77.9	55.4	52.1	80.2	75.6	80.7	79.3
Boiler Efficiency, incl. FWH - %	87.1	88.2		94.8	92.9	89.0	92.6	82.4	88.7	63.5	59.3	90.3	86.5	91.5	91.0
Boiler Pressure - Lbs./Sq. In.	240	240	241	241	241	243	241	243	242	239	239	245	247	246	246
Steam Chest Pressure - Lbs./Sq. In.	224	225	225	225	225	230	230	233	231	226	226	232	236	237	235
Back Pressure - Lbs./Sq. In.	8.5	8.4	8.8	8.7	8.6	8.7	8.1	8.2	8.3	8.1	8.1	8.0	8.0	7.9	7.7
Pressure Exhaust Steam to Nozzle - Lbs./Sq. In.	8.2	8.1	8.0	8.2	8.2	6.8	7.8	8.3	7.7	7.3	7.5	6.9	7.1	7.5	7.6
Pressure Exhaust Steam to FWH - Lbs./Sq. In.	6.7	6.7	6.3	6.7	6.7	6.3	6.4	6.6	6.4	6.7	7.1	7.0	6.3	6.0	5.9
Temperature Steam to Steam Chest - °F.	634	632	643	636	647	632	625	634	630	640	640	645	625	618	622
Temperature Exhaust Steam to Nozzle - °F.	287	285	288	273	277	274	290	305	291	266	266	290	283	288	289
Temperature Exhaust Steam to FWH - °F.	300	305	287	285	286	297	336	351	330	274	274	305	324	327	337
Temperature Water from Tender - °F.	76	76	76	77	77	73	74	74	74	75	75	74	74	75	74
Temperature Water from FWH - °F.	227	227	227	229	229	227	222	220	223	230	231	230	224	224	221
Temperature Flue Gas in Smokebox - °F.	553	552	560	551	558	547	538	548	543	554	554	557	538	532	536
Draft Back of Smokebox - Ins. Water	16.6	16.5	17.2	16.5	16.7	16.0	14.8	14.9	15.2	17.8	19.0	17.9	14.0	13.6	14.6
Firebox Draft - Ins. Water	10.5	10.4	11.0	10.4	10.5	10.0	9.5	9.4	9.6	11.8	12.6	11.6	9.0	8.9	9.3
Carbon Dioxide (CO <sub>2</sub> ) in Flue Gas - %						12.3	11.8	11.0	11.4	11.7	11.1	11.2	11.0	11.5	11.5
Excess Air - %						30.0	35.5	45.0	40.0	37.0	44.0	43.0	45.0	39.0	39.0



## SUMMARY DATA SHEET—RUNS 27-31

Run and Area No.	27 E 1	27 E 2	27 E 3	27 E 4	27 E 5	28 W 1	28 W 2	28 W 3	28 W 5	29 E 1	29 E 2	29 E 3	29 E 4	29 E 5	29 E 6	30 W 1	30 W 2	30 W 3	30 W 4	30 W 5	31 E 1	31 E 2	31 E 3	31 E 4	31 E 5	31 E 6
Length of Run - Miles	8.88	9.89	7.63	6.33	6.91	6.50	7.18	6.99	5.52	6.28	12.00	6.40	5.68	9.05	4.45	14.85	8.08	8.11	10.29	4.33	11.00	7.16	11.06	9.87	6.54	11.63
Running Time - Hrs.	0.20	0.35	0.25	0.30	0.30	0.15	0.15	0.30	0.30	0.15	0.35	0.15	0.20	0.60	0.25	0.35	0.20	0.30	0.40	0.25	0.25	0.15	0.35	0.45	0.30	0.60
Average Speed - MPH	44.40	28.26	30.52	21.10	23.03	43.33	47.87	23.30	18.40	41.87	34.29	42.67	28.40	15.08	17.80	42.43	40.40	27.03	25.73	17.32	44.00	47.73	31.60	21.93	21.80	19.38
Average Developed Adjusted DB Horsepower	3,422	2,901	3,204	2,718	2,542	2,435	2,695	2,536	2,368	3,639	3,485	3,546	3,280	2,169	2,516	2,969	3,205	2,969	2,875	2,284	3,320	3,439	3,178	2,497	2,852	2,565
Average Cutoff - %	53.4	67.3	61.1	72.2	68.7	44.6	43.7	63.3	72.6	55.8	61.6	55.6	63.2	73.3	73.3	48.7	54.1	63.9	63.2	68.6	50.6	50.3	57.7	73.3	73.2	73.2
No. Loaded Cars, incl. Test Cars	31	31	18	18	18	17	17	17	17	27	27	27	13	13	13	18	18	18	18	18	26	26	26	15	15	15
No. Empty Cars, incl. Caboose	5	5	4	4	4	1	1	1	1	12	12	12	12	12	12	1	1	1	1	1	10	10	10	8	8	8
Weight of Train, Actual, excl. of Loco. - M's	3,670	3,670	2,179	2,199	2,199	2,065	2,065	2,065	2,065	3,694	3,694	3,694	2,256	2,256	2,256	1,906	1,906	1,906	1,906	1,906	3,577	3,577	3,577	2,219	2,219	2,219
Weight of Train, Actual, excl. of Loco. - Tons	1,835	1,835	1,100	1,100	1,100	1,033	1,033	1,033	1,033	1,847	1,847	1,847	1,128	1,128	1,128	953	953	953	953	953	1,786	1,786	1,786	1,110	1,110	1,110
Average Weight per Car - Tons	51.0	51.0	50.0	50.0	50.0	57.4	57.4	57.4	57.4	47.4	47.4	47.4	45.1	45.1	45.1	50.1	50.1	50.1	50.1	50.1	49.6	49.6	49.6	48.3	48.3	48.3
Weight of Train, Adjusted Tons CORRECTED TO 80 MCARS	1,721.4	1,762.9	1,071.3	1,078.1	1,059.3	955.3	950.9	1,000.0	1,005.2	1,776.4	1,788.7	1,748.0	1,113.7	1,108.6	1,117.7	906.0	913.8	930.0	931.6	936.3	1,666.5	1,670.9	1,716.7	1,088.3	1,021.0	1,091.8
Gross Ton Miles	15,286	17,435	8,174	6,824	7,320	6,196	6,827	6,990	5,549	11,156	21,464	11,187	6,326	19,033	4,974	13,454	7,384	7,542	9,586	4,054	18,332	11,964	18,987	10,742	6,677	12,698
Oil Fired, Dry - Gals. CORRECTED TO 60°F AND FOR BOILER BLOWOFF	145.4	223.8	172.1	186.0	197.3	89.6	90.8	173.1	175.6	102.7	240.5	110.5	138.0	308.4	139.4	213.6	129.3	180.7	238.5	134.0	167.4	106.6	233.3	277.7	203.0	376.0
Heat Value of Oil, Dry - BTU's/Lb.	18,033	18,033	18,033	18,033	18,033	18,039	18,039	18,039	18,039	18,057	18,057	18,057	18,057	18,057	18,057	18,033	18,033	18,033	18,033	18,033	18,057	18,057	18,057	18,057	18,057	18,057
Weight of Oil, Dry - Lbs./Gal.	8.442	8.442	8.442	8.442	8.442	8.436	8.436	8.436	8.436	8.444	8.444	8.444	8.444	8.444	8.444	8.389	8.389	8.389	8.389	8.389	8.391	8.391	8.391	8.391	8.391	8.391
Oil Fired per 1000 DBHP Hr. - Gals.	212.4	220.4	214.9	228.1	256.8	245.3	224.7	227.6	247.2	188.1	197.1	207.7	210.4	237.0	221.5	205.5	201.8	202.9	207.4	234.7	201.7	206.6	209.8	247.1	237.3	244.3
Oil Fired per DBHP Hr. - Lbs.	1.7931	1.8606	1.8142	1.9256	2.1679	2.0694	1.8956	1.9200	2.0850	1.5880	1.6640	1.7540	1.7770	2.0010	1.8700	1.7240	1.6930	1.7020	1.7400	1.9690	1.6920	1.7340	1.7600	2.0730	1.9910	2.0500
Oil Fired per DBHP Hr., Corrected to 18300 BTU's/Lb. - Lbs.	1.7669	1.8334	1.7877	1.8975	2.1362	2.0398	1.8685	1.8930	2.0550	1.5670	1.6420	1.7310	1.7530	1.9740	1.8450	1.6990	1.6680	1.6770	1.7150	1.9400	1.6690	1.7110	1.7370	2.0450	1.9650	2.0230
Oil Fired per Hr. per Cu. Ft. FB Volume - Lbs.	11.321	9.953	10.730	9.658	10.249	9.288	9.431	8.984	9.102	10.656	10.707	11.484	10.749	8.005	8.680	9.438	10.016	9.320	9.312	8.297	10.371	10.992	10.329	9.549	10.480	9.708
Oil Fired per Hr. - Gals.	727	639	689	620	658	597	606	577	585	684	687	737	690	514	557	610	647	602	596	536	670	710	667	617	677	627
Oil Fired per Mile - Gals.	16.4	22.6	22.6	29.4	28.6	13.8	12.7	24.8	31.8	16.3	20.0	17.3	24.3	34.1	31.3	14.0	16.0	22.3	23.2	30.9	15.2	14.9	21.1	28.1	31.0	32.3
Oil Fired per 1000 GTM - Gals.	9.5	12.8	21.1	27.3	27.0	14.5	13.3	24.8	31.6	9.2	11.2	9.9	21.8	30.7	28.0	15.9	17.5	24.0	24.9	33.1	9.1	8.9	12.3	25.8	30.4	29.6
Water from Tender - Gals. CORRECTED FOR BOILER BLOWOFF AND BOILER LEVEL DIFFERENCE	1,521	2,488	2,019	2,003	2,144	1,017	1,005	1,816	1,814			1,068	1,639	3,302	1,651	2,219		1,808	2,496		1,769		2,585	3,081	2,126	4,135
Water from Tender per Hour - Gals.	7,605	7,109	8,876	6,677	7,147	6,780	6,700	6,053	6,047			7,120	8,195	5,503	6,604	6,340		6,027	6,240		7,076		7,386	6,847	7,087	6,892
Water from Tender per Mile - Gals.	171	252	265	316	310	186	140	260	329			167	289	365	371	149		223	243		161		234	312	325	356
Water from Tender per 1000 GTM - Gals.	100	143	247	294	293	164	147	260	327			95	259	329	332	165		240	260		96		136	287	318	326
Water to Boiler - Gals.	1,841	2,870	2,038	2,352	2,739	1,148	1,033	2,236	2,252	1,327	3,187	1,431	1,838	3,929	1,726	2,917	1,622	2,344	3,042	1,812	2,206	1,283	2,893	3,482	2,581	4,688
Steam to Cylinders - Lbs./Hr.	73,340	67,980	77,876	63,593	68,237	64,947	63,987	57,457	57,307	53,687	58,431	68,373	78,580	51,907	62,548	60,191	50,115	57,617	59,263	39,856	67,988	90,400	70,780	64,933	67,313	65,352
Steam per DBHP Hr. - Lbs.	21.4	23.4	24.3	23.4	26.6	26.7	23.7	22.7	24.2	14.8	16.8	19.3	24.0	23.9	24.9	20.3	15.6	19.4	20.6	17.5	20.5	26.3	22.3	26.0	23.6	25.5
Steam per DBHP Hr., from and at 212°F. - Lbs.	25.4	27.8	28.5	27.8	31.7	31.0	28.0	26.9	28.5	17.6	20.0	22.8	28.5	28.4	29.7	24.1	18.7	23.1	24.6	20.7	24.3	31.3	26.4	31.0	28.1	30.4
Boiler Efficiency, less FWH - %	77.1	80.9	83.1	78.3	80.4	80.3	78.5	74.1	74.8			71.8	85.1	76.7	84.1	74.9		72.2	75.9		78.2	83.8	70.2	69.8	77.6	69.2
Boiler Efficiency, incl. FWH - %	88.5	92.1	93.8	89.1	92.5	91.1	88.1	84.4	85.3			83.3	96.6	86.9	94.3	85.8		83.1	86.4		89.9	94.7	81.1	80.4	88.5	79.7
Boiler Pressure - Lbs./Sq. In.	233	221	241	243	242	236	236	241	241	234	237	239	242	241	241	239	239	241	240	235	242	242	243	242	244	243
Steam Chest Pressure - Lbs./Sq. In.	210	195	220	228	224	220	217	223	226	213	214	218	222	230	227	221	219	223	222	221	223	221	222	224	222	224
Back Pressure - Lbs./Sq. In.	9.3	8.5	9.9	7.7	9.3	5.9	5.3	6.9	7.0	9.9	9.9	9.4	9.4	6.3	7.7	7.6	8.3	8.0	7.2	6.0	9.8	10.3	9.3	8.3	9.6	8.6
Pressure Exhaust Steam to Nozzle - Lbs./Sq. In.	8.4	7.8	9.2	7.2	8.5	5.9	5.3	6.0	6.2	8.2	9.0	9.2	8.8	5.5	6.7	6.2	6.7	7.1	6.4	4.8	8.8	9.1	8.4	7.0	8.3	7.3
Pressure Exhaust Steam to FWH - Lbs./Sq. In.	6.1	6.1	7.6	5.6	6.7	4.7	4.4	5.4	5.4	7.1	8.0	8.6	7.4	4.5	5.6	5.9	6.5	6.5	5.6	3.5	7.8	8.4	7.4	6.5	7.3	6.6
Temperature Steam to Steam Chest - °F.	662	655	638	652	660	594	633	638	623	662	664	656	659	632	648	640	640	666	658	620	658	670	654	652	674	656
Temperature Exhaust Steam to Nozzle - °F.	316	345	296	334	345	233	267	316	291	316	335	324	315	316	327	289	281	332	330	282	307	315	328	329	359	334
Temperature Exhaust Steam to FWH - °F.	309	361	304	365	373	241	267	320	337	313	339	324	327	356	360	291	282	341	349	325	308	310	339	362	385	365
Temperature Water from Tender - °F.	72	72	73	72	72	74	74	75	76	74	74	76	74	74	75	76	76	76	76	78	75	75	75	73	73	73
Temperature Water from FWH - °F.	232	227	232	223	226	223	222	220	220	227	229	233	229	215	220	219	211	229	223	213	231	234	230	222	225	222
Temperature Flue Gas in Smokebox - °F.	590	575	565	575	582	525	557	557	546	585	584	589	583	559	572	567	563	589	581	542	590	601	581	583	604	586
Draft Back of Smokebox - Ins. Water	18.9	18.4	19.4	16.5	18.3	12.8	14.2	15.8	14.2	20.8	20.1	19.5	18.8	12.3	15.7	15.7	17.9	16.8	15.7	13.8	18.1	19.2	18.3	15.5	17.8	16.0
Firebox Draft - Ins. Water	13.0	12.8	13.5	11.5	12.5	8.7	9.8	10.8	9.7	13.6	13.3	13.0	12.5	9.1	11.2	10.8	12.1	11.3	10.6	9.4	12.1	12.8	12.4	10.5	11.7	10.8
Carbon Dioxide (CO <sub>2</sub> ) in Flue Gas - %			13.8	14.1	14.3	15.0	14.8	13.9	14.9			14.9	14.2	14.7	14.7	14.7	14.8	13.9	14.0				14.3	14.4	14.3	
Excess Air - %			16.5	14.0	13.0	7.5	9.0	16.0	8.5			8.5	13.5	9.5	9.5	9.5	9.0	16.0	15.0				13.0	12.0	13.0	

SUMMARY DATA SHEET — RUNS 32-39

Run and Area No.	32W1	32W2	32W3	32W4	33E1	33E2	33E3	34W1	34W2	34W3	35E1	35E2	35E3	35E4	36W1	36W2	36W3	36W4	39PE1	39PE5	39PE6	39PE8	39PE9	39PE10	39PE11	39PE12
Length of Run - Miles	6.18	3.60	6.91	4.64	5.06	3.66	7.48	5.96	7.21	6.69	6.61	8.26	5.77	5.09	19.95	16.88	7.93	4.96	10.13	9.91	16.10	5.29	7.62	8.67	8.41	7.86
Running Time - Hrs.	0.15	0.25	0.25	0.35	0.15	0.20	0.30	0.15	0.35	0.30	0.15	0.20	0.20	0.30	0.30	0.35	0.15	0.25	0.15	0.30	0.30	0.15	0.15	0.15	0.15	0.20
Average Speed - MPH	41.20	14.40	27.64	13.26	33.73	18.30	24.93	39.73	20.60	22.30	44.07	41.30	28.85	16.97	49.83	48.23	52.87	19.84	67.53	33.03	53.67	35.27	50.80	57.80	56.07	39.30
Average Developed Adjusted DB Horsepower	3915	2083	2938	1866	3219	2367	2982	3255	2642	2851	3019	3085	3103	2299	2789	2879	2749	2721	3063	2965	3084	2218	2961	2721	2658	3062
Average Cutoff - %	52.9	73.3	66.2	73.3	58.2	73.3	69.0	53.6	66.8	66.6	52.5	52.5	63.6	73.3	43.5	45.1	40.8	72.9	42.4	53.0	43.9	53.6	45.4	49.0	41.8	52.5
No. Loaded Cars, incl. Test Cars	18	18	18	18	16	16	16	20	20	20	33	33	19	19	22	22	22	22	16	18	18	18	18	15	15	15
No. Empty Cars, incl. Caboose	1	1	1	1	2	2	2	3	3	3	5	5	5	5	1	1	1	1								
Weight of Train, Actual, excl. of Loco. - M's	2116	2116	2116	2116	2039	2039	2039	1911	1911	1911	3703	3703	2195	2195	2031	2031	2031	2031	2310	2472	2472	2472	2472	1937	1937	1937
Weight of Train, Actual, excl. of Loco. - Tons	1058	1058	1058	1058	1020	1020	1020	956	956	956	1852	1852	1098	1098	1016	1016	1016	1016	1155	1236	1236	1236	1236	968	968	968
Average Weight per Car - Tons	55.7	55.7	55.7	55.7	56.7	56.7	56.7	41.6	41.6	41.6	48.7	48.7	45.8	45.8	44.2	44.2	44.2	44.2	72.2	68.7	68.7	68.7	68.7	64.6	64.6	64.6
Weight of Train, Adjusted Tons CORRECTED TO 80M CARS	1001.8	1036.7	862.9	1039.6	997.5	1010.7	1007.9	955.6	929.9	955.1	1744.1	1710.5	1082.6	1087.7	986.8	989.4	978.8	1008.8								
Gross Ton Miles	6.121	3.732	6.011	4.801	5.047	3.629	7.539	5.695	6.560	6.390	11.530	19.129	6.247	5.536	19.153	16.701	7.762	5.004	11.700	12.249	19.920	6.538	9.418	8.397	8.195	7.612
Oil Fired, Dry - Gals. CORRECTED TO 60°F AND FOR BOILER BLOWOFF	102.9	119.1	166.1	155.7	110.8	118.1	207.5	102.1	201.3	179.2	101.9	134.2	142.9	174.5	172.3	209.7	82.9	161.9	119.3	178.0	197.6	98.5	93.2	97.3	97.5	132.3
Heat Value of Oil, Dry - BTU's/Lb.	17.865	17.865	17.865	17.865	17.857	17.857	17.857	17.869	17.869	17.869	17.792	17.792	17.792	17.792	17.822	17.822	17.822	17.822	17.824	17.592	17.846	17.846	17.846	17.882	17.882	17.882
Weight of Oil, Dry - Lbs./Gal.	8.398	8.398	8.398	8.398	8.298	8.298	8.298	8.313	8.313	8.313	8.337	8.337	8.337	8.337	8.361	8.361	8.361	8.361	8.376	8.235	8.336	8.336	8.336	8.353	8.353	8.353
Oil Fired per 1000 DBHP Hr. - Gals.	200.2	228.7	226.1	238.4	229.4	249.5	231.9	209.1	217.6	209.6	225.1	217.5	230.2	258.6	211.9	208.1	201.0	238.0	248.7	200.1	219.3	204.1	209.9	238.4	277.5	216.0
Oil Fired per DBHP Hr. - Lbs.	1687	1921	1899	2002	1904	2070	1924	1738	1809	1792	1867	1813	1919	2156	1772	1740	1681	1920	2083	1698	1828	1701	1750	1991	2042	1809
Oil Fired per DBHP Hr., Corrected to 18300 BTU's/Lb. - Lbs.	1.647	1.825	1.854	1.954	1.858	2.020	1.877	1.697	1.766	1.701	1.815	1.763	1.866	2.096	1.726	1.695	1.637	1.938	2.037	1.584	1.783	1.659	1.707	1.946	1.995	1.863
Oil Fired per Hr. per Cu. Ft. FB Volume - Lbs.	10.632	7.390	10.288	6.895	11.302	9.037	10.597	10.441	8.826	9.153	10.463	10.321	10.980	8.954	9.113	9.239	8.528	10.000	11.777	9.009	10.137	10.103	9.570	9.999	10.015	10.199
Oil Fired per Hr. - Gals.	686	477	664	445	738	590	692	681	575	597	680	671	714	582	591	599	553	648	762	593	659	657	622	649	650	662
Oil Fired per Mile - Gals.	16.7	33.1	24.0	33.5	21.9	32.3	27.7	17.1	27.2	26.8	15.4	16.2	24.8	34.3	11.9	12.4	10.5	32.6	11.3	18.0	12.3	18.6	12.2	11.2	11.6	16.8
Oil Fired per 1000 GTM - Gals.	16.6	31.9	27.6	32.4	21.9	31.9	27.5	17.9	34.7	28.0	8.8	9.5	22.9	31.5	12.0	12.6	10.7	32.4	9.8	19.5	9.9	15.1	9.9	11.6	12.0	17.4
Water from Tender - Gals. CORRECTED FOR BOILER BLOWOFF AND BOILER LEVEL DIFFERENCE	1056	1170	2115	1681	1093	1183	2214	1169	2132	2152	1131	1570	1385	2008	1867	2389	924	1258	1219	1821	1918	1006	1109	1178	866	1377
Water from Tender per Hour - Gals.	7040	4680	8460	4803	7287	5915	7380	7793	6091	7173	7540	7850	6925	6693	6223	6826	6160	5032	8127	6070	6393	6707	7993	7853	5273	5362
Water from Tender per Mile - Gals.	171	325	306	362	216	323	296	196	296	322	171	190	240	394	125	142	117	254	120	184	119	190	146	136	103	175
Water from Tender per 1000 GTM - Gals.	171	314	352	350	217	320	294	205	325	337	98	111	222	363	127	143	119	251	104	149	96	158	118	140	106	180
Water to Boiler - Gals.	1156	1593	2060	2166	1447	1566	2102	1244	2712	2412	1292	1607	1844	2264	2285	2685	1151	2257	1468	2558	2934	1330	1121	1176	1284	1633
Steam to Cylinders - Lbs./Hr.	62847	43892	80928	49360	70153	53895	53813	75027	52783	68247	72673	60300	66575	63617	59873	65769	59087	63212	79887	53890	57247	59933	67207	72413	51613	63315
Steam per DBHP Hr. - Lbs.	19.9	21.1	27.5	24.1	21.8	23.6	18.0	23.0	21.9	23.9	24.1	24.4	21.5	28.3	21.5	22.8	21.5	23.2	24.4	18.2	19.1	18.6	22.7	26.6	19.4	20.7
Steam per DBHP Hr., from and at 212°F. - Lbs.	23.6	25.2	32.6	28.5	25.7	27.8	21.4	27.1	26.0	28.5	28.8	29.0	25.5	33.4	25.5	27.1	25.6	27.6	29.1	21.8	22.8	22.2	27.0	31.7	23.2	24.6
Boiler Efficiency, less FWH - %		73.9	80.9	79.8				74.1		77.0	72.2	75.6	74.2	73.8	79.3	73.8	84.1	69.4	78.7		76.1	86.2			77.8	
Boiler Efficiency, incl. FWH - %		84.2	91.9	90.7				85.3		88.5	83.9	86.3	86.1	84.9	90.9	85.5	96.4	81.9	90.3		87.2	96.8			89.3	
Boiler Pressure - Lbs./Sq. In.	241	240	237	238	242	239	240	238	241	241	228	243	243	239	243	243	242	242	240	243	246	239	241	239	233	232
Steam Chest Pressure - Lbs./Sq. In.	217	227	215	228	217	221	214	213	222	221	205	219	215	219	222	222	223	222	214	219	222	216	220	211	208	209
Back Pressure - Lbs./Sq. In.	10.7	6.8	9.7	5.9	11.8	8.7	11.7	10.0	8.8	9.2	8.8	9.0	10.0	7.5	6.9	7.3	5.5	10.1	7.7	8.5	8.2	10.3	8.6	8.4	6.8	9.1
Pressure Exhaust Steam to Nozzle - Lbs./Sq. In.	8.8	5.0	8.0	4.4	9.3	6.8	9.7	8.5	7.5	7.7	7.9	8.0	8.6	5.6	5.5	6.0	4.0	7.8	8.8	7.2	7.6	8.8	8.1	7.2	6.1	8.0
Pressure Exhaust Steam to FWH - Lbs./Sq. In.	8.6	4.8	7.1	4.7	9.2	6.5	8.6	7.6	6.4	6.7	7.2	8.8	7.6	5.5	5.0	5.6	3.8	6.3	7.2	6.7	6.4	8.2	7.4	6.9	4.9	7.3
Temperature Steam to Steam Chest - °F.	656	622	644	614	648	620	654	644	643	652	665	656	656	622	652	654	648	645	664	664	652	666	655	658	652	660
Temperature Exhaust Steam to Nozzle - °F.	317	296	323	283	303	286	343	297	314	329	313	310	316	283	269	284	266	321								
Temperature Exhaust Steam to FWH - °F.	312	343	343	337	303	340	363	298	348	357	311	316	323	327	272	284	270	357	322	315	289	316	296	284	285	314
Temperature Water from Tender - °F.	72	71	71	73	72	73	73	73	75	75	70	72	72	72	69	69	69	66	69	78	76	75	75	70	70	63
Temperature Water from FWH - °F.	232	206	225	210	233	218	227	230	221	223	229	228	230	219	225	227	222	222	229	220	221	227	227	226	219	226
Temperature Flue Gas in Smokebox - °F.	578	542	569	540	572	548	578	566	564	573	594	580	582	546	576	580	572	569	602	598	580	588	577	594	584	581
Draft Back of Smokebox - Ins. Water	19.5	12.0	17.8	11.2	20.2	14.9	19.1	19.8	15.9	17.0	17.3	17.9	19.8	14.9	13.2	13.8	11.0	16.7	19.3	16.1	15.6	18.8	17.8	17.2	15.0	17.6
Firebox Draft - Ins. Water	14.5	8.9	12.5	7.8	14.5	10.8	13.7	14.7	11.6	12.5	11.8	12.9	15.3	10.8	9.6	10.1	8.2	12.0	13.7	11.4	12.3	13.3	13.3	12.2	10.8	12.4
Carbon Dioxide (CO <sub>2</sub> ) in Flue Gas - %	14.0	13.3	14.4	13.8	14.5	13.5	13.8	14.7	13.6	13.8			15.1	14.8												
Excess Air - %	15.0	21.0	12.0	16.5	11.5	19.0	16.5	18.0	17.0	16.5			7.0	9.0												



# SUMMARY DATA SHEET — RUNS 39-40

Run and Area No.	39PE13	39PE14	39PE15	39PE16	39PE17	40PW1	40PW2	40PW3	40PW4	40PW5	40PW6	40PW7	40PW8	40PW9	40PW10	40PW11
Length of Run - Miles	15.68	10.15	10.68	7.80	15.25	7.05	15.25	11.68	10.85	10.86	10.59	13.00	6.59	11.10	14.74	10.48
Running Time - Hrs.	0.30	0.20	0.20	0.20	0.25	0.15	0.25	0.20	0.25	0.25	0.20	0.20	0.15	0.15	0.20	0.25
Average Speed - MPH	52.27	50.75	53.90	39.00	61.00	47.00	61.00	58.40	43.80	43.44	52.95	65.00	43.93	74.00	73.70	41.96
Average Developed Adjusted DB Horsepower	3,083	3,192	3,077	3,230	2,818	3,277	3,124	3,293	3,276	3,437	3,268	3,181	2,667	2,559	2,710	3,195
Average Cutoff - %	44.7	45.7	42.9	55.0	38.3	44.7	42.8	44.7	50.3	50.9	46.4	41.4	44.3	38.5	42.3	50.6
No. Loaded Cars, incl. Test Cars	15	15	15	15	15	15	15	15	15	15	15	15	16	16	16	16
No. Empty Cars, incl. Caboose																
Weight of Train, Actual, excl. of Loco. - M's	1,937	1,937	1,937	1,937	1,937	2,041	2,041	2,041	2,041	2,041	2,041	2,041	2,225	2,225	2,225	2,225
Weight of Train, Actual, excl. of Loco. - Tons	968	968	968	968	968	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,112	1,112	1,112	1,112
Average Weight per Car - Tons	64.6	64.6	64.6	64.6	64.6	68.1	68.1	68.1	68.1	68.1	68.1	68.1	69.6	69.6	69.6	69.6
Weight of Train, Adjusted Tons Corrected to 80 MCARS																
Gross Ton Miles	15,186	9,830	10,344	7,554	14,770	7,195	15,563	11,919	11,174	11,083	10,807	13,267	7,331	12,349	16,398	11,670
Oil Fired, Dry - Gals. <small>CORRECTED TO 60°F AND FOR BOILER BLOWOFF</small>	188.4	147.1	137.8	175.4	175.2	97.7	170.0	135.1	173.7	175.1	140.0	137.0	88.6	99.7	132.4	169.1
Heat Value of Oil, Dry - BTU's/Lb.	17,882	17,882	17,882	17,882	17,882	18,003	18,003	18,003	18,003	18,003	18,003	18,003	18,075	18,075	18,075	18,027
Weight of Oil, Dry - Lbs./Gal.	8,353	8,353	8,353	8,353	8,353	8,419	8,419	8,419	8,419	8,419	8,419	8,419	8,426	8,426	8,426	8,421
Oil Fired per 1000 DBHP Hr. - Gals.	203.8	230.5	224.0	271.6	248.7	198.8	217.7	205.1	212.1	203.8	214.2	215.4	221.4	246.6	253.6	211.7
Oil Fired per DBHP Hr. - Lbs.	1,702	1,925	1,871	2,262	2,077	1,674	1,833	1,727	1,786	1,716	1,803	1,813	1,866	2,078	2,137	1,783
Oil Fired per DBHP Hr., Corrected to 18300 BTU's/Lb. - Lbs.	1,663	1,881	1,828	2,217	2,030	1,647	1,803	1,699	1,757	1,688	1,774	1,784	1,843	2,052	2,110	1,756
Oil Fired per Hr. per Cu. Ft. FB Volume - Lbs.	9.681	11.343	10.617	13.515	10.800	10.111	10.566	10.482	10.793	10.877	10.877	10.642	9.176	9.808	10.684	10.501
Oil Fired per Hr. - Gals.	62.8	73.6	68.9	87.7	70.1	65.1	68.0	67.5	69.5	70.0	70.0	68.5	59.0	63.1	68.7	67.6
Oil Fired per Mile - Gals.	12.0	14.5	12.9	22.5	11.5	13.9	11.1	11.6	15.9	16.1	13.2	10.5	13.4	8.5	9.3	16.1
Oil Fired per 1000 GTM - Gals.	12.4	15.0	13.3	23.2	11.9	13.6	10.9	11.3	15.5	15.8	13.0	10.3	12.1	7.7	8.4	14.5
Water from Tender - Gals. <small>CORRECTED FOR BOILER BLOW-OFF AND BOILER LEVEL DIFF.</small>	2032	1692		1314	1847	876		1422	1731	1817	1433	1356	935			1772
Water from Tender per Hour - Gals.	6773	8460		6570	7388	5840		7110	6924	7268	7165	6780	6633			7088
Water from Tender per Mile - Gals.	130	167		168	121	124		122	158	167	135	104	151			169
Water from Tender per 1000 GTM - Gals.	134	172		174	125	122		119	155	164	133	102	136			152
Water to Boiler - Gals.	2,563	1,736	1,688	1,806	2,147	1,234	2,108	1,709	2,194	2,173	1,792	1,851	1,173	1,202	1,824	2,155
Steam to Cylinders - Lbs./Hr.	61,890	79,210	53,015	60,785	68,076	53,653	75,008	65,840	64,044	67,620	66,605	62,670	62,187	78,873	84,820	64,836
Steam per DBHP Hr. - Lbs.	20.1	24.8	17.2	18.8	24.2	16.4	24.0	20.0	19.6	19.7	20.4	19.7	23.3	30.8	31.4	20.3
Steam per DBHP Hr., from and at 212°F. - Lbs.	24.2	29.3	20.6	23.3	29.0	19.6	28.7	24.0	23.4	23.5	24.4	23.7	27.5	37.1	36.6	24.3
Boiler Efficiency, less FWH - %	81.7	84.0			78.9	68.5		78.6	74.5	77.1	76.2	74.8	82.5			81.9
Boiler Efficiency, incl. FWH - %	94.0	95.0			90.1	80.5		90.5	86.5	89.1	88.4	87.5	95.5			92.8
Boiler Pressure - Lbs./Sq. In.	234	240	241	238	240	241	238	240	240	241	241	238	237	239	240	234
Steam Chest Pressure - Lbs./Sq. In.	209	216	213	211	214	218	216	214	215	216	219	216	216	215	212	211
Back Pressure - Lbs./Sq. In.	7.5	10.8	8.5	12.2	6.8	9.5	8.7	8.6	10.0	10.6	10.8	9.4	6.6	7.7	10.6	9.9
Pressure Exhaust Steam to Nozzle - Lbs./Sq. In.	6.5	9.7	7.6	11.1	6.1	8.0	7.7	7.8	9.8	9.9	10.0	8.9	5.3	6.8	9.0	9.1
Pressure Exhaust Steam to FWH - Lbs./Sq. In.	6.1	8.8	6.8	9.8	6.5	7.2	7.1	7.2	8.3	9.1	8.7	7.5	5.2	6.2	8.8	8.0
Temperature Steam to Steam Chest - °F.	667	638	663	645	649	667	665	674	661	668	671	671	640	680	614	673
Temperature Exhaust Steam to Nozzle - °F.																
Temperature Exhaust Steam to FWH - °F.	301	291	297	315	287	284	293	302	310	317	310	300	275	309	277	307
Temperature Water from Tender - °F.	63	53	53	54	54	58	58	58	58	58	56	54	51	51	55	71
Temperature Water from FWH - °F.	220	224	222	266	215	227	225	226	227	230	228	223	227	223	220	230
Temperature Flue Gas in Smokebox - °F.	595	580	612	592	595	587	591	601	584	592	601	599	569	609	573	599
Draft Back of Smokebox - Ins. Water	16.3	17.9	17.8	19.6	15.8	17.2	17.6	18.2	18.6	20.2	19.4	18.0	16.0	16.3	21.6	20.4
Firebox Draft - Ins. Water	11.5	12.6	12.4	13.5	10.9	12.0	12.4	12.9	13.0	14.2	13.6	12.8	11.0	12.3	14.9	14.3
Carbon Dioxide (CO <sub>2</sub> ) in Flue Gas - %																
Excess Air - %																

# SUMMARY DATA SHEET - RUNS 37-38

Run and Area No.	37E1	37E2	37E3	37E4	37E5	38W1	38W2	38W3
Length of Run - Miles	6.56	11.68	7.58	7.47	7.23	11.91	4.96	6.73
Running Time - Hrs.	0.25	0.40	0.15	0.25	0.35	0.25	0.30	0.45
Average Speed - MPH	26.24	29.20	50.53	29.88	20.66	47.64	16.53	14.76
Average Developed Adjusted DB Horsepower	3,120	3,172	3,439	3,135	2,665	3,533	2,311	2,129
Average Cutoff - %	66.6	64.3	56.4	60.5	71.2	50.9	73.0	72.7
No. Loaded Cars, incl. Test Cars	28	28	28	20	20	11	11	11
No. Empty Cars, incl. Caboose	12	12	12	3	3	13	13	13
Weight of Train, Actual, excl. of Loco. - M's	3719	3719	3719	2237	2237	2,157	2,157	2,157
Weight of Train, Actual, excl. of Loco. - Tons	1,860	1,860	1,860	1,119	1,119	1,079	1,079	1,079
Average Weight per Car - Tons	46.5	46.5	46.5	48.7	48.7	45.0	45.0	45.0
Weight of Train, Adjusted Tons CORRECTED TO 80 MCARS	1,808.9	1,810.3	1,760.1	1,091.0	1,099.4	1,050.4	1,070.6	1,071.1
Gross Ton Miles	11,866	21,144	13,342	8,150	7,949	12,510	5,310	7,209
Oil Fired, Dry - Gals. CORRECTED TO 60°F AND FOR BOILER BLOWOFF	184.7	295.0	114.4	183.2	229.7	180.3	167.4	233.9
Heat Value of Oil, Dry - BTU's/Lb.	17,888	17,888	17,888	17,888	17,888	17,937	17,937	17,937
Weight of Oil, Dry - Lbs./Gal.	8.321	8.321	8.321	8.321	8.321	8.432	8.432	8.432
Oil Fired per 1000 DBHP Hr. - Gals.	236.7	232.5	221.8	233.7	246.2	204.2	241.4	244.1
Oil Fired per DBHP Hr. - Lbs.	1.970	1.935	1.846	1.945	2.049	1.722	2.035	2.058
Oil Fired per DBHP Hr., Corrected to 18300 BTU's/Lb. - Lbs.	1.926	1.891	1.804	1.901	2.003	1.688	1.995	2.017
Oil Fired per Hr. per Cu. Ft. FB Volume - Lbs.	11.342	11.333	11.716	11.250	10.068	11,215	8.685	8.086
Oil Fired per Hr. - Gals.	739	738	763	733	656	721	558	520
Oil Fired per Mile - Gals.	28.2	25.3	15.1	24.5	31.8	15.1	33.7	34.8
Oil Fired per 1000 GTM - Gals.	15.6	14.0	8.6	22.5	28.9	14.4	31.5	32.4
Water from Tender - Gals. CORRECTED FOR BOILER BLOW-OFF AND BOILER LEVEL DIFF.	1,949	3,017	1,281	2,014	2,536	1,635	1,995	2,503
Water from Tender per Hour - Gals.	7,796	7,543	8,540	8,056	7,246	6,540	6,650	5,562
Water from Tender per Mile - Gals.	297	258	169	270	351	137	402	372
Water from Tender per 1000 GTM - Gals.	164	143	96	247	319	131	376	347
Water to Boiler - Gals.	2,267	3,824	1,472	2,208	3,135	2,296	2,088	2,880
Steam to Cylinders - Lbs./Hr.	74,852	72,308	82,260	77,736	69,109	62,884	63,183	52,613
Steam per DBHP Hr. - Lbs.	24.0	22.8	23.9	24.8	25.9	17.8	27.3	24.7
Steam per DBHP Hr., from and at 212°F. - Lbs.	28.5	27.2	28.3	29.3	30.8	21.3	32.3	29.3
Boiler Efficiency, less FWH - %	78.7	77.5	72.6	71.7	83.2	64.2	53.7	77.3
Boiler Efficiency, incl. FWH - %	89.9	89.2	84.3	82.9	95.2	80.6	61.3	87.2
Boiler Pressure - Lbs./Sq. In.	243	245	245	245	245	241	244	244
Steam Chest Pressure - Lbs./Sq. In.	214	214	215	219	220	215	225	229
Back Pressure - Lbs./Sq. In.	10.2	9.8	8.6	9.5	9.0	8.5	7.5	6.7
Pressure Exhaust Steam to Nozzle - Lbs./Sq. In.	7.8	7.8	8.6	8.2	7.3	7.8	5.4	4.6
Pressure Exhaust Steam to FWH - Lbs./Sq. In.	7.4	7.3	7.6	7.6	6.1	6.6	5.9	5.1
Temperature Steam to Steam Chest - °F.	655	661	648	650	647	665	630	621
Temperature Exhaust Steam to Nozzle - °F.	332	340	306	297	332	312	317	301
Temperature Exhaust Steam to FWH - °F.	349	352	306	309	362	307	341	329
Temperature Water from Tender - °F.	70	70	70	69	69	69	70	70
Temperature Water from FWH - °F.	228	227	228	230	221	227	219	212
Temperature Flue Gas in Smokebox - °F.	590	596	584	575	575	596	556	547
Draft Back of Smokebox - Ins. Water	18.9	18.6	19.0	18.1	17.1	18.5	13.4	12.1
Firebox Draft - Ins. Water	13.5	13.0	13.3	13.3	11.9	13.3	10.0	9.1
Carbon Dioxide (CO <sub>2</sub> ) in Flue Gas - %				14.2	14.1	14.4	13.8	13.3
Excess Air - %				13.5	14.0	12.0	16.5	21.0